



FCC PART 27

TEST AND MEASUREMENT REPORT

For

Wireless Extenders, Inc.

One Meca Way,

Norcross, GA 30093, USA

FCC ID: SO4YX550-AWS-VLTE

Report Type: Original Report	Product Type: 4G Cellular Signal Amplifier
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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1205301-27	Original Report	2012-07-02

1 GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

This test and measurement report was prepared on behalf of Wireless Extenders, Inc., and their product FCC ID: SO4YX550-AWS-VLTE, model: YX550, which will henceforth be referred to as the “EUT” as referred to in this report, is a 4G cellular signal amplifier for both downlink (signals from the network to the subscriber’s equipment) and uplink (signals from subscriber’s equipment to the network). The 4G bands it operates on are the AWS band (2.1 GHz/1.7 GHz, band 4) and the Verizon Wireless 700 MHz LTE band (band 13). The YX550 is designed for small office and home office environments.

Technical Specification

Modulation	Frequency (MHz)	
	Downlink	Uplink
LTE	746-757	776-787
WCDMA/HSPA	2110-2155	1710-1755

1.2 Mechanical Description

The EUT dimension is approximately 17.8cm (L) x 9.2cm (W) x 1.0cm (H) and weighs approximately 230g

The test data gathered are from production sample. Serial number: R1205301-1 assigned by BACL.

1.3 Objective

This type approval report is prepared on behalf of Wireless Extenders, Inc. in accordance with Part 2, Subpart J, and Part 27 of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC rules for RF output power, modulation characteristic, occupied bandwidth, spurious emissions at antenna terminal, field strength of spurious radiation, band edge, and conducted and radiated margin.

1.4 Related Submittal(s)/Grant(s)

N/A

1.5 Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of Federal Regulations Title 47 Part 2, Sub-part J as well as the following parts:

Part 27 - Miscellaneous Wireless Communications Services
Applicable Standards: TIA/EIA-603-C, ANSI C63.4-2003.

All radiated and conducted emission measurement was performed at Bay Area Compliance Laboratory, Corp. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

1.6 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in the field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on CISPR16-4-2:2003, The Treatment of Uncertainty in EMC Measurements, the values ranging from ± 2.0 dB for Conducted Emissions tests and ± 4.0 dB for Radiated Emissions tests are the most accurate estimates pertaining to uncertainty of EMC measurements at BACL Corp.

1.7 Test Facility

The test site used by BACL Corp. to collect radiated and conducted emissions measurement data is located at its facility in Sunnyvale, California, USA.

The test site at BACL Corp. has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997, and Article 8 of the VCCI regulations on December 25, 1997. The test site also complies with the test methods and procedures set forth in CISPR 22:2008 §10.4 for measurements below 1 GHz and §10.6 for measurements above 1 GHz as well as ANSI C63.4-2003, ANSI C63.4-2009, TIA/EIA-603 & CISPR 24:2010.

The Federal Communications Commission and Voluntary Control Council for Interference have the reports on file and they are listed under FCC registration number: 90464 and VCCI Registration No.: A-0027. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL Corp. is an American Association for laboratory Accreditation (A2LA) accredited laboratory (Lab Code 3297-02). The current scope of accreditations can be found at

<http://www.a2la.org/scopepdf/3297-02.pdf?CFID=1132286&CFTOKEN=e42a3240dac3f6ba-6DE17DCB-1851-9E57-477422F667031258&jsessionid=8430d44f1f47cf2996124343c704b367816b>

2 SYSTEM TEST CONFIGURATION

2.1 Justification

The EUT was configured for testing according to TIA/EIA-603-C.

The final qualification test was performed with the EUT operating at normal mode.

2.2 EUT Exercise Software

N/A, signal was sent through EUT using a signal generator, device was set to normal operating mode.

2.3 Equipment Modifications

No modifications were made to the EUT.

2.4 Local Support Equipment and Software List and Details

Manufacturers	Descriptions	Models	Serial Numbers
HP	Signal Generator	8648C	MY45091309
Dell	Laptop	Latitude D600	CN-0X2034-48643-3A6-8307
Agilent	ESG-D Series Signal Generator	E4438C	MY45091309
Agilent	Signal Studio for 3GPP LTE	N7624B	-
Agilent	Signal Studio for WCDMA/HSPA	N7600B	-

2.5 Internal Configurations of EUT

Manufacturer	Description	Model	Serial Number
Wireless Extenders, Inc.	Main PCB Board	YX550	-

2.6 EUT Power Supply Information

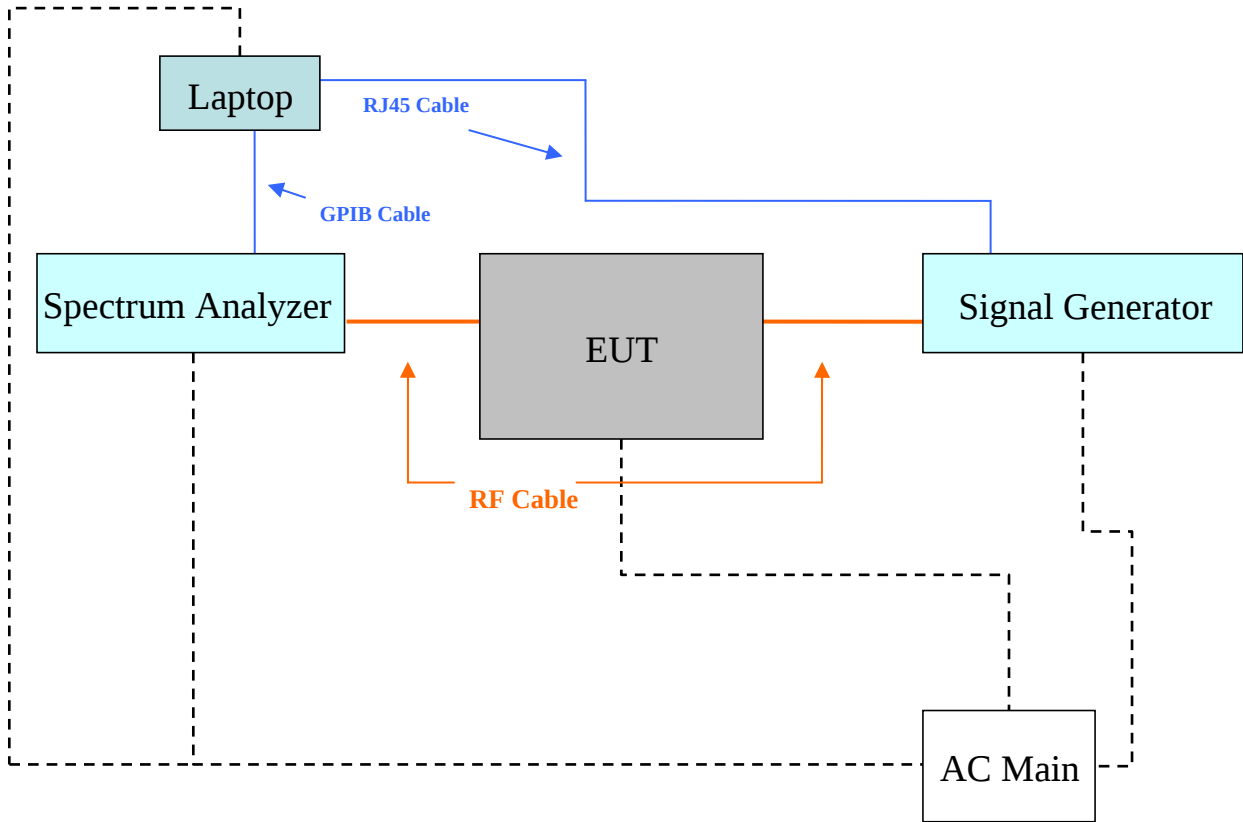
Manufacturer	Description	Model	Serial Number
I.T.E	AC/DC Power Adapter	FY0502000	-

2.7 Interface Ports and Cables

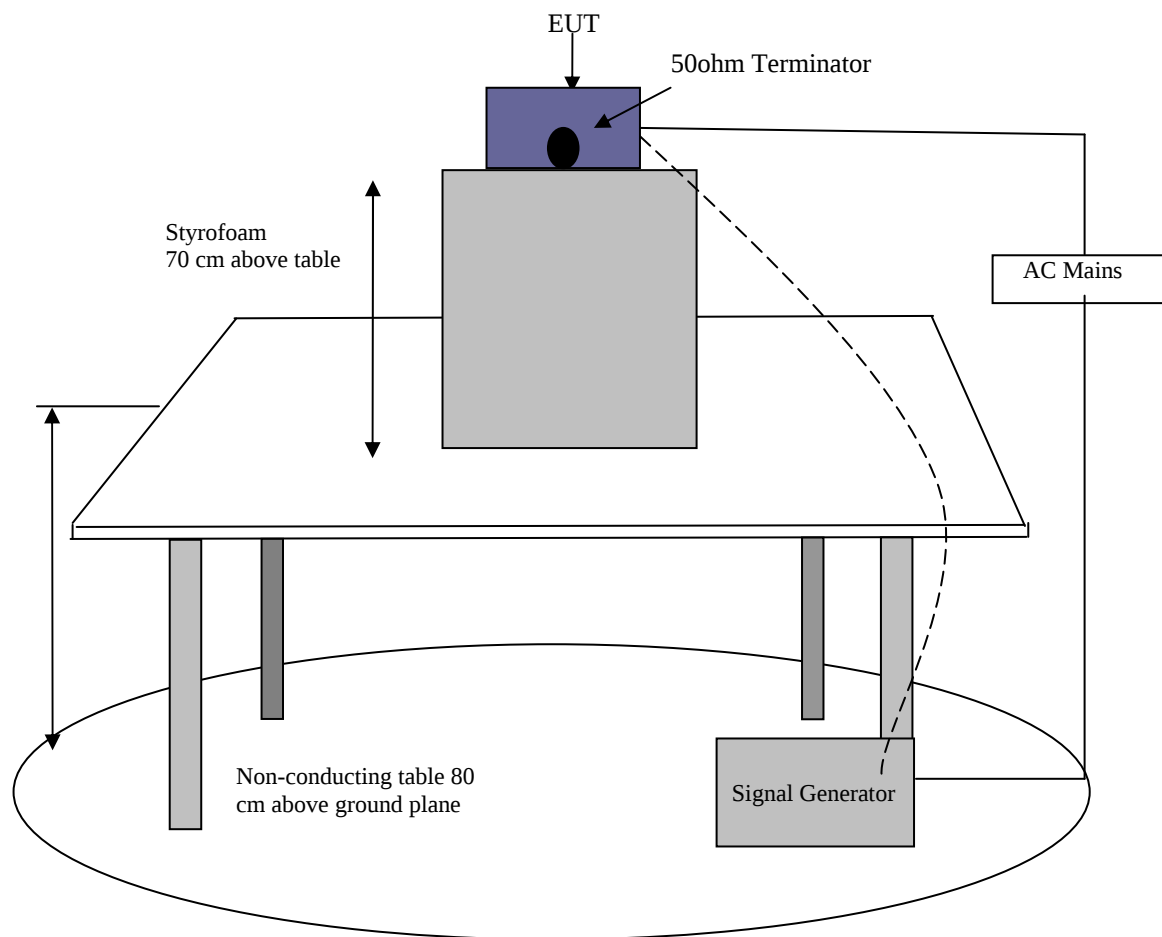
Cable Description	Length (m)	To	From
RF Cable	< 1	EUT	Spectrum Analyzer
RF Cable	< 1	EUT	Signal Generator

2.8 Test Setup Block Diagram

Antenna Port Conducted Testing



Radiated Emissions Testing



3 SUMMARY OF TEST RESULTS

FCC Rules	Description of Tests	Results
§2.1046, §27.50(b)	RF Output Power	Compliant
§2.1047	Modulation Characteristics	N/A ¹
§2.1049, §27.53 (c)	Occupied Bandwidth	Compliant
§2.1053, §27.53 (c)	Spurious Radiated Emissions	Compliant
§2.1051, §27.53 (c)	Spurious Emissions at Antenna Terminals	Compliant
§27.53 (c)(g)	Band Edge	Compliant
§2.1055, §27.54	Frequency Stability	Note ¹
§2.1091, §27.52	RF Exposure Information	Compliant

1) Note: EUT is a signal booster.

4 FCC §2.1046 & §27.50 – RF OUTPUT POWER

4.1 Applicable Standard

According to FCC §27.50, control stations and mobile stations transmitting in the 746–757 MHz, 758–763 MHz, 776–793 MHz, and 805–806 MHz bands and fixed stations transmitting in the 787–788 MHz and 805–806 MHz bands are limited to 30 watts ERP.

According to FCC §27.50, fixed, mobile, and portable (hand-held) stations operating in the 1710–1755 MHz band are limited to 1 watt EIRP.

4.2 Test Procedure

Conducted:

The RF output of the transmitter was connected to the signal generator and the spectrum analyzer through sufficient attenuation.

4.3 Test Equipment List and Details

Manufacturers	Descriptions	Models	Serial Numbers	Calibration Dates
Agilent	Spectrum Analyzer	E4440A	MY44303352	2012-05-10
Agilent	Signal Generator	E4438C	MY45091309	2012-05-03

Statement of Traceability: BACL Corp. attests that all calibrations have been performed according to A2LA requirements, traceable to the NIST.

4.4 Test Environmental Conditions

Temperature:	21-22°C
Relative Humidity:	49-51 %
ATM Pressure:	101-102 kPa

The testing was performed by Jeffrey Wu from 2012-05-30 to 2012-05-31 in RF Site.

4.5 Test Results

AWS Band (Band 4)

Mode		Channel	Frequency (MHz)	Input Power (dBm)	Output Power (dBm)
WCDMA/HSPA	1710-1755 MHz Uplink	Low	1712.4	-47.82	19.65
		Middle	1732.4	-48.82	20.02
		High	1752.6	-45.82	20.17
	2110-2155 MHz Downlink	Low	2112.4	-56.82	10.01
		Middle	2132.4	-52.82	10.09
		High	2152.6	-54.82	10.06

Mode	Modulation	Frequency (MHz)	Input Power (dBm)	Output Power (dBm)
Downlink 2110-2155 MHz	QPSK (1.4 MHz)	2111	-54.82	10.64
	QPSK (1.4 MHz)	2132	-51.82	9.96
	QPSK (1.4 MHz)	2154	-53.82	10.06
	16QAM (1.4 MHz)	2111	-54.82	10.63
	16QAM (1.4 MHz)	2132	-51.82	9.96
	16QAM (1.4 MHz)	2154	-53.82	10.06
	64QAM (1.4 MHz)	2111	-54.82	10.78
	64QAM (1.4 MHz)	2132	-51.82	10.06
	64QAM (1.4 MHz)	2154	-53.82	10.18
	QPSK (3 MHz)	2112	-54.82	10.72
	QPSK (3 MHz)	2132	-51.82	9.75
	QPSK (3 MHz)	2153	-53.82	9.93
	16QAM (3 MHz)	2112	-54.82	10.73
	16QAM (3 MHz)	2132	-50.82	10.54
	16QAM (3 MHz)	2153	-53.82	9.86
	64QAM (3 MHz)	2112	-54.82	10.64
	64QAM (3 MHz)	2132	-50.82	10.51
	64QAM (3 MHz)	2153	-53.82	9.85
	QPSK (5 MHz)	2113	-55.82	9.89
	QPSK (5 MHz)	2132	-50.82	10.53
	QPSK (5 MHz)	2152	-53.82	9.86
	16QAM (5 MHz)	2113	-55.82	9.89
	16QAM (5 MHz)	2132	-50.82	10.51
	16QAM (5 MHz)	2152	-53.82	9.90
	64QAM (5 MHz)	2113	-55.82	9.82
	64QAM (5 MHz)	2132	-50.82	10.41
	64QAM (5 MHz)	2152	-53.82	9.78
	QPSK (10 MHz)	2115	-55.82	10.26
	QPSK (10 MHz)	2132	-51.82	9.79
	QPSK (10 MHz)	2150	-52.82	10.54
	16QAM (10 MHz)	2115	-55.82	10.26
	16QAM (10 MHz)	2132	-51.82	9.78
	16QAM (10 MHz)	2150	-52.82	10.53
	64QAM (10 MHz)	2115	-55.82	10.28
	64QAM (10 MHz)	2132	-51.82	9.79
	64QAM (10 MHz)	2150	-52.82	10.58

Mode	Modulation	Frequency (MHz)	Input Power (dBm)	Output Power (dBm)
Uplink 1710-1755 MHz	QPSK (1.4 MHz)	1711	-46.82	20.40
	QPSK (1.4 MHz)	1732	-47.82	20.76
	QPSK (1.4 MHz)	1754	-45.82	20.66
	16QAM (1.4 MHz)	1711	-46.82	20.33
	16QAM (1.4 MHz)	1732	-47.82	20.72
	16QAM (1.4 MHz)	1754	-45.82	20.64
	64QAM (1.4 MHz)	1711	-46.82	20.31
	64QAM (1.4 MHz)	1732	-47.82	20.70
	64QAM (1.4 MHz)	1754	-45.82	20.65
	QPSK (3 MHz)	1712	-46.82	20.32
	QPSK (3 MHz)	1732	-47.82	20.67
	QPSK (3 MHz)	1753	-45.82	20.28
	16QAM (3 MHz)	1712	-46.82	20.29
	16QAM (3 MHz)	1732	-47.82	20.66
	16QAM (3 MHz)	1753	-45.82	20.30
	64QAM (3 MHz)	1712	-46.82	20.29
	64QAM (3 MHz)	1732	-47.82	20.63
	64QAM (3 MHz)	1753	-45.82	20.29
	QPSK (5 MHz)	1713	-46.82	20.45
	QPSK (5 MHz)	1732	-47.82	20.66
	QPSK (5 MHz)	1752	-45.82	20.06
	16QAM (5 MHz)	1713	-46.82	20.44
	16QAM (5 MHz)	1732	-47.82	20.65
	16QAM (5 MHz)	1752	-45.82	20.06
	64QAM (5 MHz)	1713	-46.82	20.43
	64QAM (5 MHz)	1732	-47.82	20.64
	64QAM (5 MHz)	1752	-45.82	20.06
	QPSK (10 MHz)	1715	-47.82	20.09
	QPSK (10 MHz)	1732	-47.82	20.65
	QPSK (10 MHz)	1750	-45.82	19.96
	16QAM (10 MHz)	1715	-47.82	20.14
	16QAM (10 MHz)	1732	-47.82	20.64
	16QAM (10 MHz)	1750	-45.82	19.97
	64QAM (10 MHz)	1715	-47.82	20.16
	64QAM (10 MHz)	1732	-47.82	20.63
	64QAM (10 MHz)	1750	-45.82	19.97

LTE Band (Band 13)

Mode	Modulation	Frequency (MHz)	Input Power (dBm)	Output Power (dBm)
746-757 MHz LTE Downlink	QPSK (1.4 MHz)	747	-55.3	13.06
	QPSK (1.4 MHz)	752	-55.3	13.44
	QPSK (1.4 MHz)	756	-53.3	13.14
	16QAM (1.4 MHz)	747	-55.3	12.98
	16QAM (1.4 MHz)	752	-55.3	13.33
	16QAM (1.4 MHz)	756	-53.3	13.08
	64QAM (1.4 MHz)	747	-55.3	12.97
	64QAM (1.4 MHz)	752	-55.3	13.28
	64QAM (1.4 MHz)	756	-53.3	13.04
	QPSK (3 MHz)	748	-55.3	12.93
	QPSK (3 MHz)	752	-55.3	12.95
	QPSK (3 MHz)	755	-53.3	13.56
	16QAM (3 MHz)	748	-55.3	12.88
	16QAM (3 MHz)	752	-55.3	12.90
	16QAM (3 MHz)	755	-53.3	13.53
	64QAM (3 MHz)	748	-55.3	12.86
	64QAM (3 MHz)	752	-55.3	12.87
	64QAM (3 MHz)	755	-53.3	13.47
	QPSK (5 MHz)	749	-55.3	13.11
	QPSK (5 MHz)	754	-54.3	12.79
	16QAM (5 MHz)	749	-55.3	13.14
	16QAM (5 MHz)	754	-54.3	12.8
	64QAM (5 MHz)	749	-55.3	13.06
	64QAM (5 MHz)	754	-54.3	12.74
	QPSK (10 MHz)	752	-54.3	13.42
	16QAM (10 MHz)	752	-54.3	13.42
	64QAM (10 MHz)	752	-54.3	13.41

Mode	Modulation	Frequency (MHz)	Input Power (dBm)	Output Power (dBm)
776-787 MHz LTE Uplink	QPSK (1.4 MHz)	777	-49.3	19.88
	QPSK (1.4 MHz)	782	-50.3	19.76
	QPSK (1.4 MHz)	786	-48.3	20.53
	16QAM (1.4 MHz)	777	-49.3	19.85
	16QAM (1.4 MHz)	782	-49.3	20.59
	16QAM (1.4 MHz)	786	-48.3	20.46
	64QAM (1.4 MHz)	777	-49.3	19.81
	64QAM (1.4 MHz)	782	-49.3	20.52
	64QAM (1.4 MHz)	786	-49.3	20.42
	QPSK (3 MHz)	778	-49.3	20.21
	QPSK (3 MHz)	782	-49.3	20.57
	QPSK (3 MHz)	785	-49.3	19.71
	16QAM (3 MHz)	778	-49.3	20.23
	16QAM (3 MHz)	782	-49.3	20.56
	16QAM (3 MHz)	785	-49.3	19.73
	64QAM (3 MHz)	778	-49.3	20.22
	64QAM (3 MHz)	782	-49.3	20.55
	64QAM (3 MHz)	785	-49.3	19.72
	QPSK (5 MHz)	779	-49.3	20.58
	QPSK (5 MHz)	784	-49.3	19.97
	16QAM (5 MHz)	779	-50.3	19.74
	16QAM (5 MHz)	784	-49.3	20.05
	64QAM (5 MHz)	779	-50.3	19.75
	64QAM (5 MHz)	784	-49.3	20.06
	QPSK (10 MHz)	782	-49.3	20.41
	16QAM (10 MHz)	782	-49.3	20.44
	64QAM (10 MHz)	782	-49.3	20.45

5 FCC §2.1049 & §27.53 - OCCUPIED BANDWIDTH

5.1 Applicable Standard

Requirements: FCC §2.1049 and §27.53.

5.2 Test Procedure

The RF output of the transmitter was connected to the simulator and the spectrum analyzer through sufficient attenuation.

The resolution bandwidth of the spectrum analyzer was set at 100 kHz and the 26 dB & 99% bandwidth was recorded.

5.3 Test Equipment List and Details

Manufacturers	Descriptions	Models	Serial Numbers	Calibration Dates
Agilent	ESG-D Series Signal Generator	E4438C	MY45091309	2012-05-04
Agilent	Spectrum Analyzer	E4446A	US44300386	2011-08-11

Statement of Traceability: BACL Corp. attests that all calibrations have been performed according to A2LA requirements, traceable to the NIST.

5.4 Test Environmental Conditions

Temperature:	21-23°C
Relative Humidity:	48-52 %
ATM Pressure:	101-102 kPa

The testing was performed by Jeffrey Wu from 2012-06-01 to 2012-06-04 at RF Site

5.5 Test Results

AWS Band (Band 4)

Frequency Band		Modulation	Frequency (MHz)	99% Emission Bandwidth	
				Input (kHz)	Output (kHz)
AWS	1700 MHz Uplink	WCDMA/HSPA	1732.4	4205.6	4166.6
	2110 MHz Downlink	WCDMA/HSPA	2132.4	4210.7	4175.7

Frequency Band		Modulation	Frequency (MHz)	99% Emission Bandwidth	
				Input (kHz)	Output (kHz)
AWS	1700 MHz Uplink	QPSK (1.4 MHz)	1732	1080.4	1080.5
		16 QAM (1.4 MHz)	1732	1080.0	1080.3
		64 QAM (1.4 MHz)	1732	1080.1	1080.4
		QPSK (3 MHz)	1732	2685.5	2687.0
		16 QAM (3 MHz)	1732	2687.6	2686.5
		64 QAM (3 MHz)	1732	2681.5	2685.9
		QPSK (5 MHz)	1732	4470.5	4471.3
		16 QAM (5 MHz)	1732	4476.7	4475.5
		64 QAM (5 MHz)	1732	4471.3	4473.1
		QPSK (10 MHz)	1732	8936.2	8937.3
		16 QAM (10 MHz)	1732	8942.2	8941.1
		64 QAM 10MHz)	1732	8942.4	8941.4
	2110 MHz Downlink	QPSK (1.4 MHz)	2132	1095.6	1095.0
		16 QAM (1.4 MHz)	2132	1094.8	1094.1
		64 QAM (1.4 MHz)	2132	1095.6	1095.9
		QPSK (3 MHz)	2132	2699.7	2699.0
		16 QAM (3 MHz)	2132	2701.5	2700.6
		64 QAM (3 MHz)	2132	2699.4	2699.3
		QPSK (5 MHz)	2132	4488.2	4487.3
		16 QAM (5 MHz)	2132	4490.0	4489.5
		64 QAM (5 MHz)	2132	4487.9	4487.0
		QPSK (10 MHz)	2132	8963.4	8962.9
		16 QAM (10 MHz)	2132	8962.8	8964.3
		64 QAM 10MHz)	2132	8962.1	8961.7

LTE Band (Band 13)

Frequency Band		Modulation	Frequency (MHz)	99% Emission Bandwidth	
				Input (kHz)	Output (kHz)
LTE	700 MHz Uplink	QPSK (1.4 MHz)	782	1081.4	1082.7
		16 QAM (1.4 MHz)	782	1080.0	1080.4
		64 QAM (1.4 MHz)	782	1080.9	1081.6
		QPSK (3 MHz)	782	2689.5	2700.1
		16 QAM (3 MHz)	782	2687.2	2701.5
		64 QAM (3 MHz)	782	2685.5	2695.5
		QPSK (5 MHz)	779	4471.3	4481.0
		16 QAM (5 MHz)	779	4475.1	4484.2
		64 QAM (5 MHz)	779	4472.0	4480.6
		QPSK (10 MHz)	782	8937.8	8886.5
		16 QAM (10 MHz)	782	8943.5	8893.7
		64 QAM 10MHz)	782	8945.4	8897.1
	700 MHz Downlink	QPSK (1.4 MHz)	752	1096.0	1095.2
		16 QAM (1.4 MHz)	752	1095.1	1095.4
		64 QAM (1.4 MHz)	752	1095.9	1096.0
		QPSK (3 MHz)	752	2700.8	2698.0
		16 QAM (3 MHz)	752	2701.8	2701.5
		64 QAM (3 MHz)	752	2701.7	2704.9
		QPSK (5 MHz)	749	4491.9	4488.1
		16 QAM (5 MHz)	749	4494.2	4489.9
		64 QAM (5 MHz)	749	4493.2	4493.3
		QPSK (10 MHz)	752	8969.5	8909.5
		16 QAM (10 MHz)	752	8968.7	8909.0
		64 QAM 10MHz)	752	8971.2	8910.8

Please refer to the following plots.

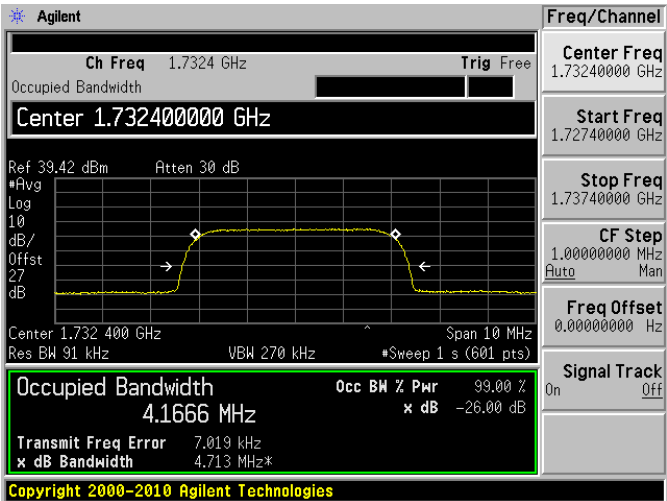
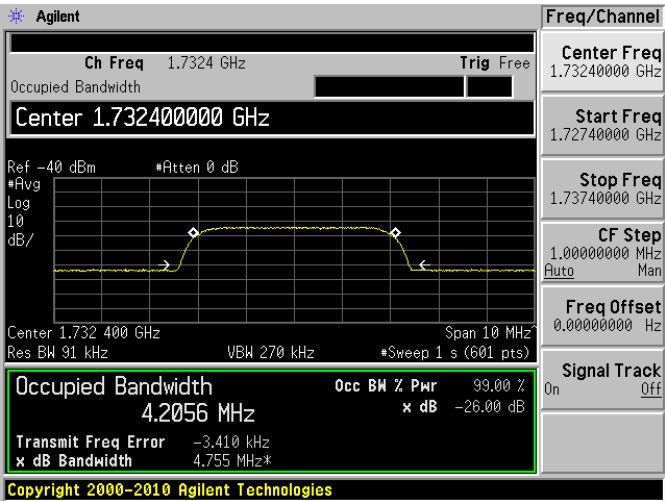
AWS Band (Band 4)

Uplink: 1710-1755 MHz

WCDMA/HSPA, Frequency: 1732.4 MHz

Input

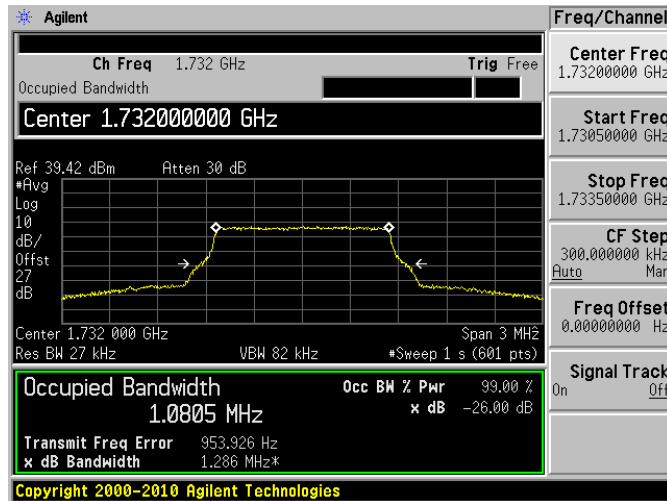
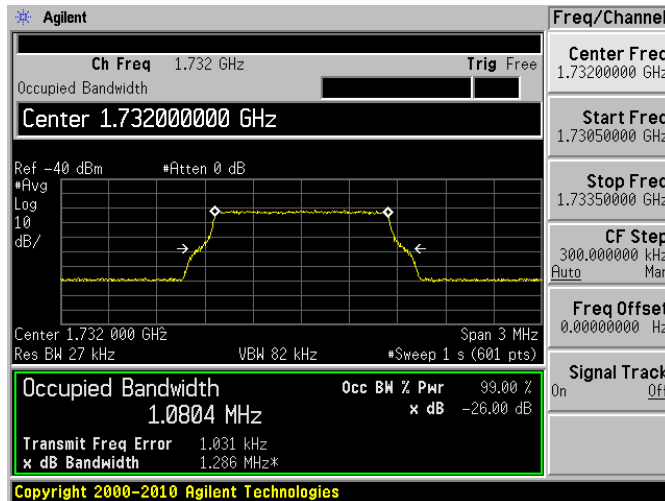
Output



Modulation: QPSK (1.4 MHz) Frequency: 1732 MHz

Input

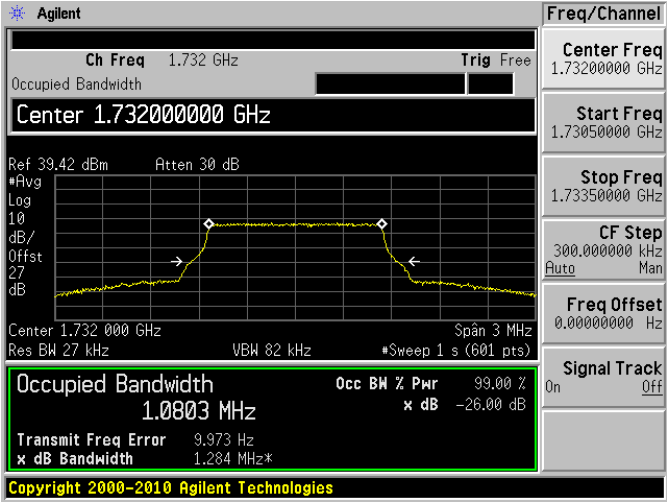
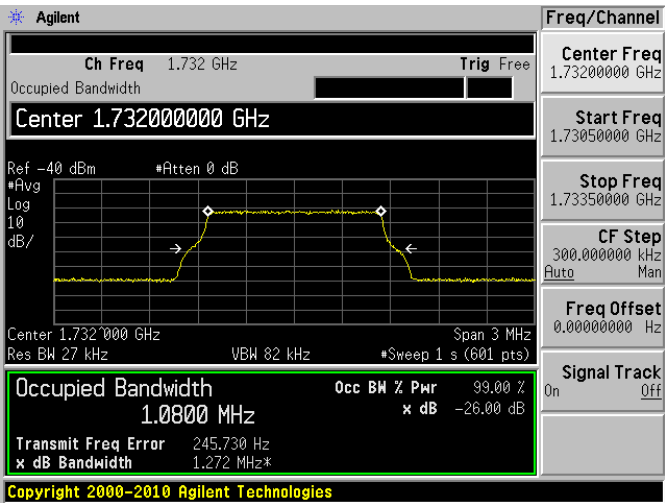
Output



Modulation: 16QAM (1.4 MHz) Frequency: 1732 MHz

Input

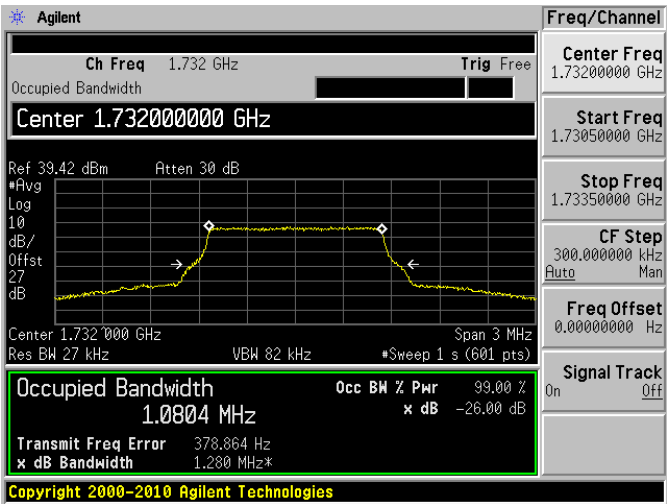
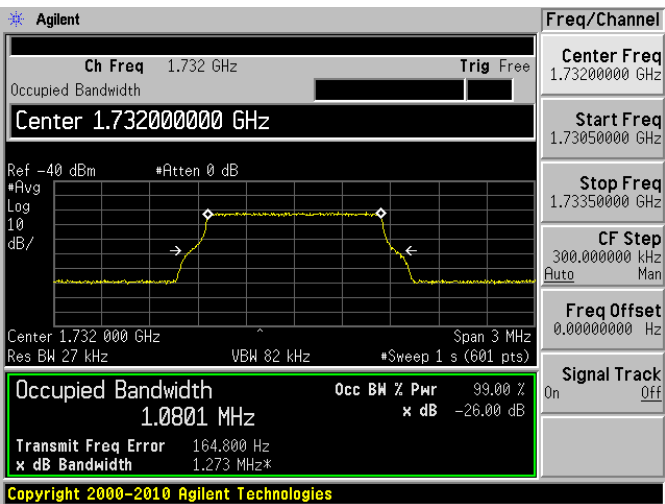
Output



Modulation: 64QAM (1.4 MHz) Frequency: 1732 MHz

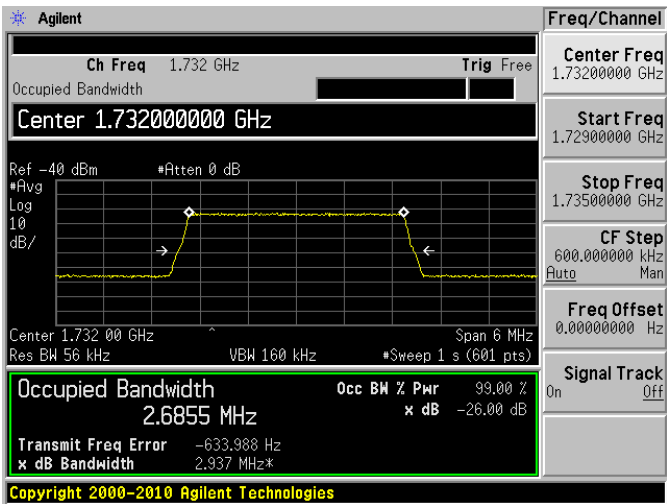
Input

Output

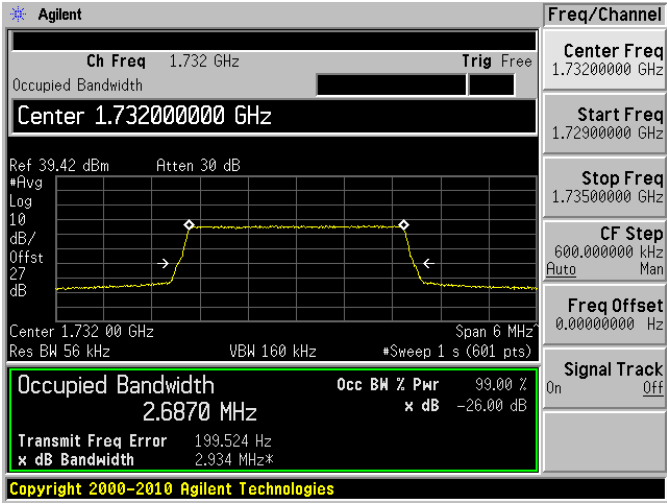


Modulation: QPSK (3 MHz) Frequency: 1732 MHz

Input

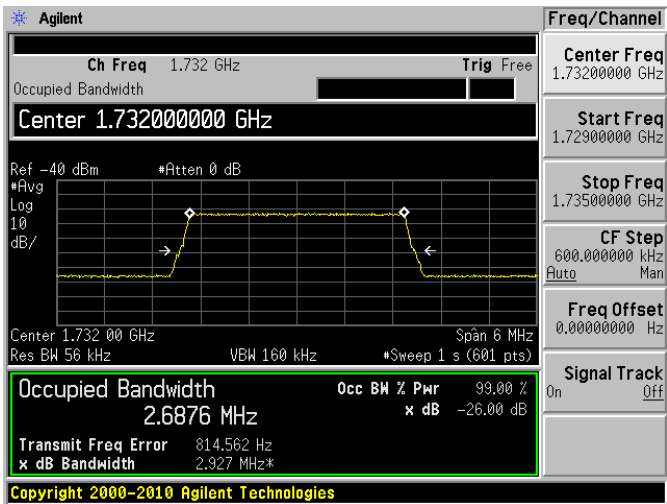


Output

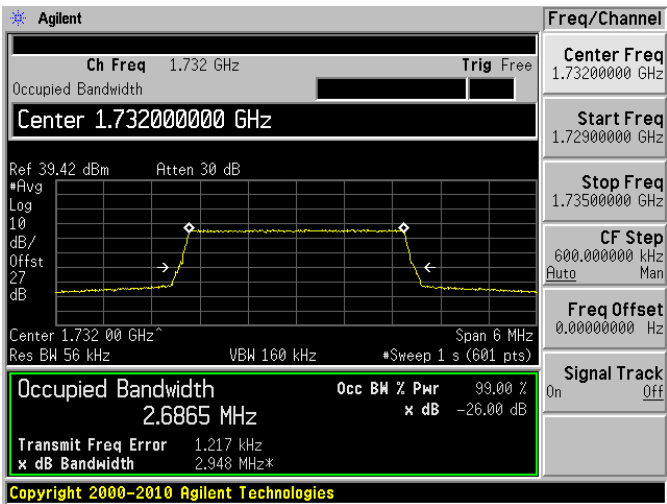


Modulation: 16QAM (3 MHz) Frequency: 1732 MHz

Input



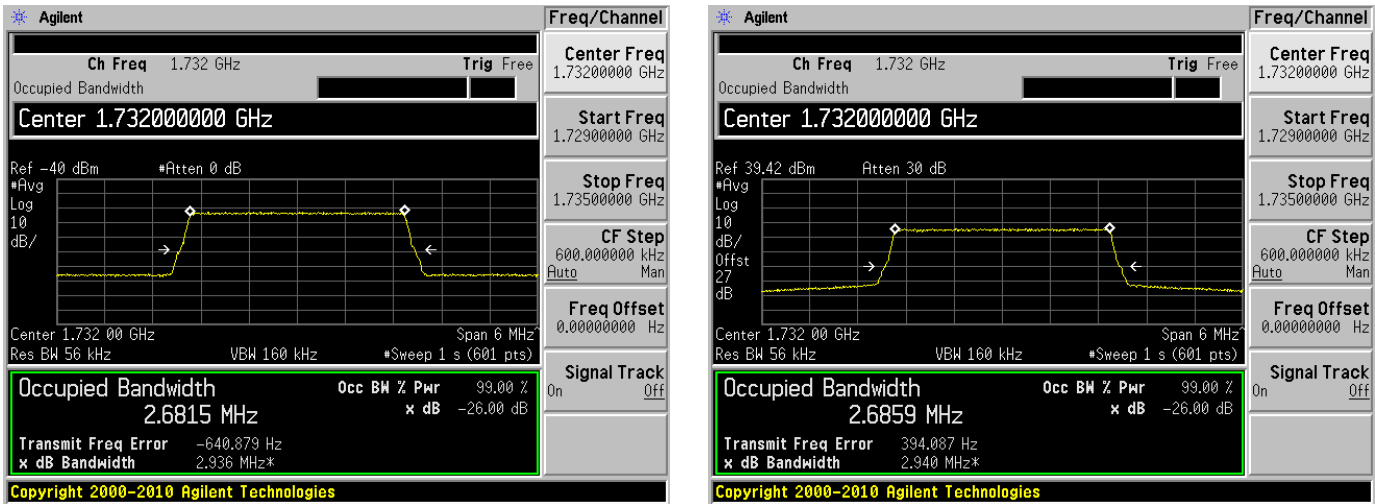
Output



Modulation: 64QAM (3 MHz) Frequency: 1732 MHz

Input

Output



Modulation: QPSK (5 MHz) Frequency: 1732 MHz

Input

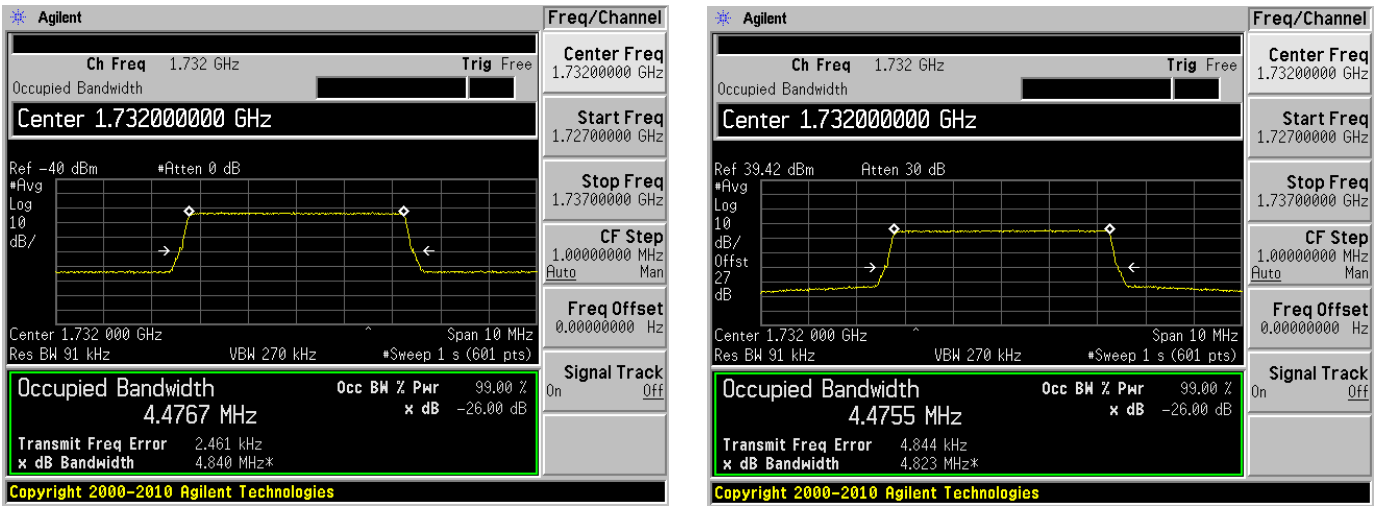
Output



Modulation: 16QAM (5 MHz) Frequency: 1732 MHz

Input

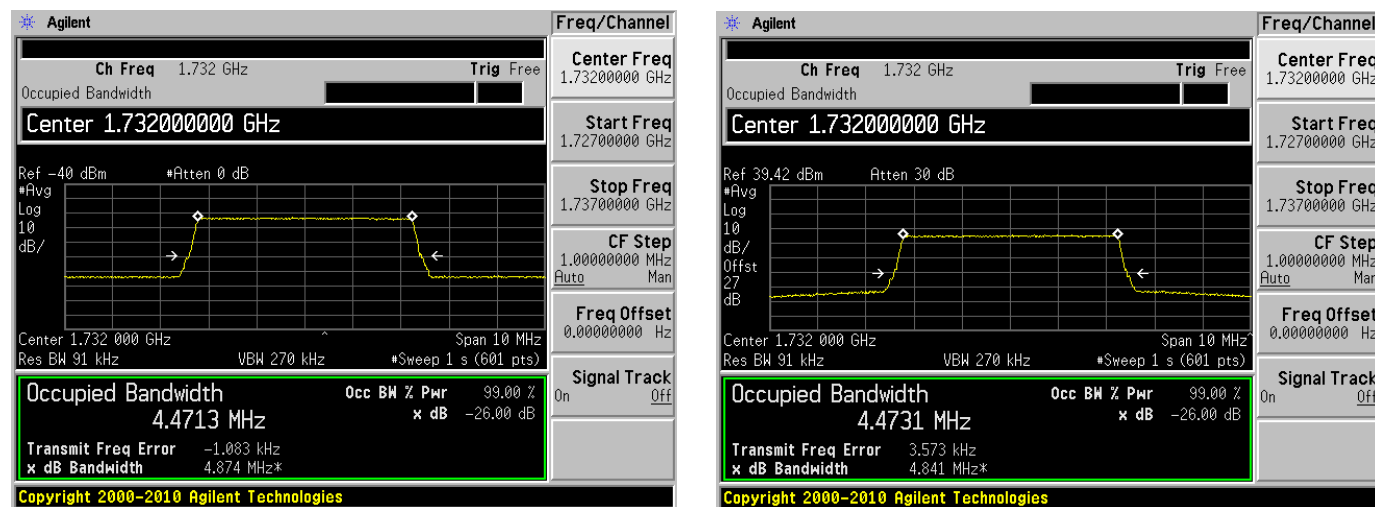
Output



Modulation: 64QAM (5 MHz) Frequency: 1732 MHz

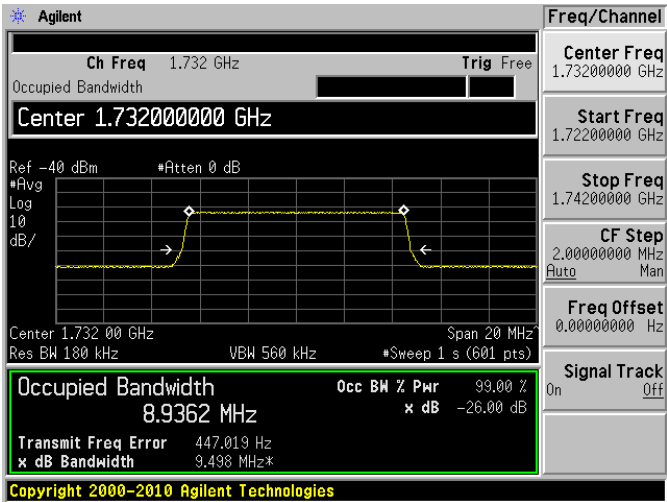
Input

Output

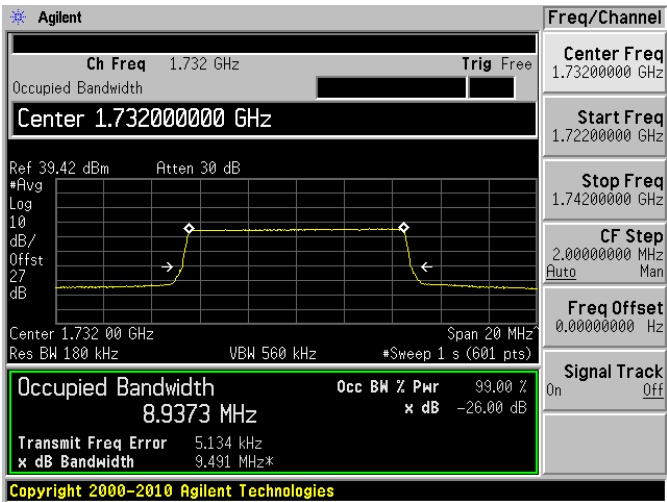


Modulation: QPSK (10 MHz) Frequency: 1732 MHz

Input

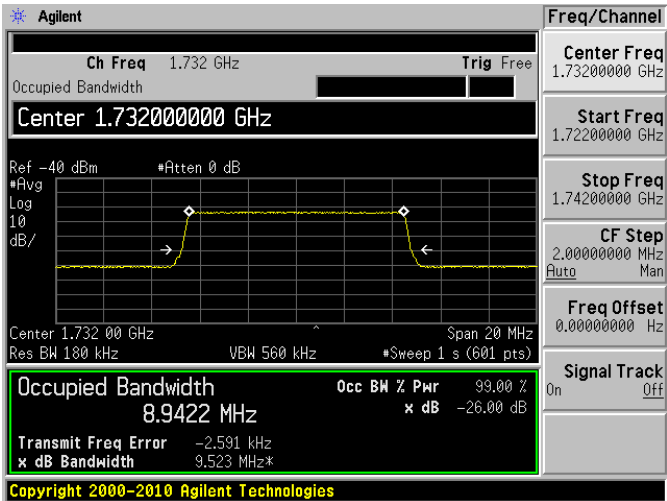


Output

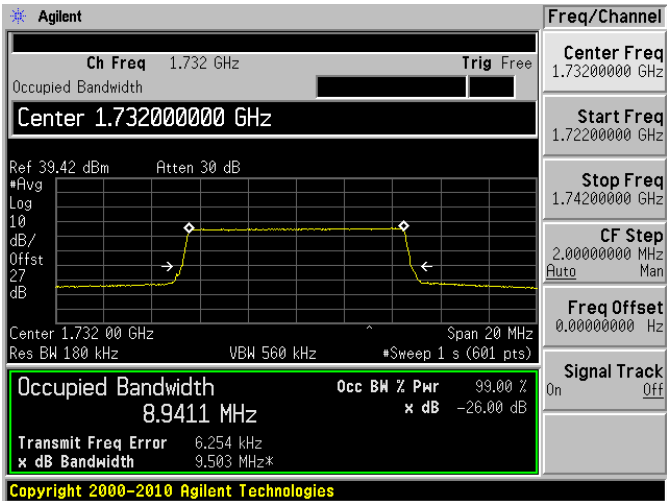


Modulation: 16QAM (10 MHz) Frequency: 1732 MHz

Input

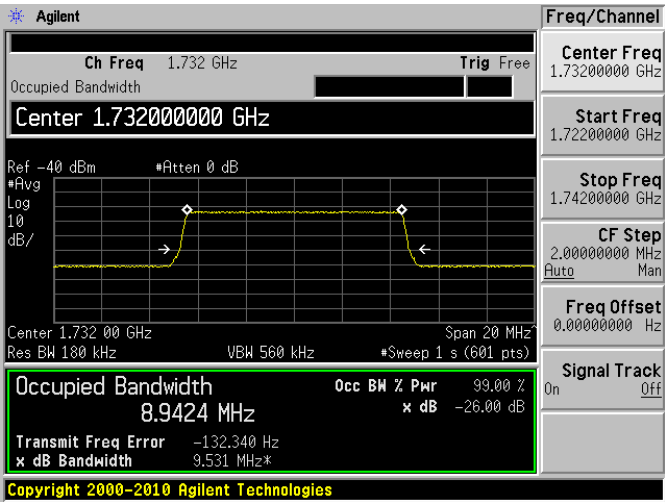


Output

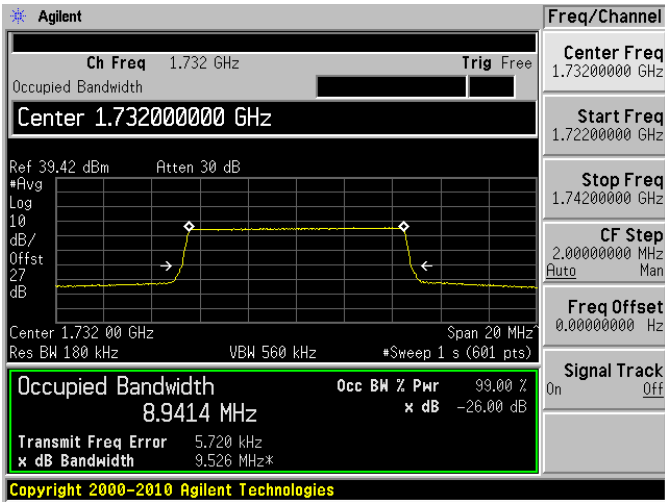


Modulation: 64QAM (10 MHz) Frequency: 1732 MHz

Input



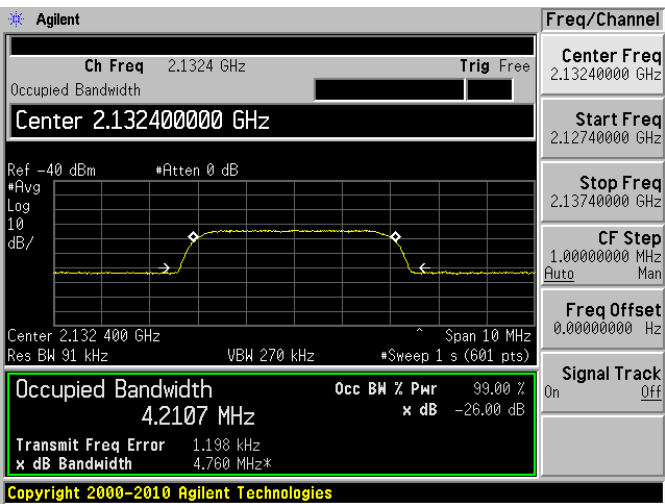
Output



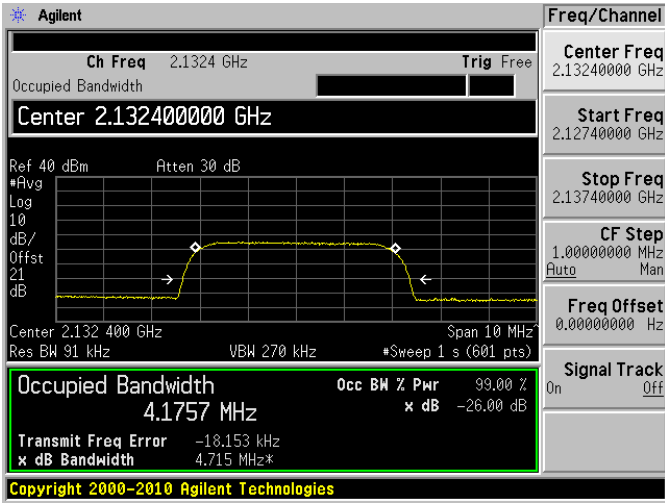
Downlink: 2110-2155 MHz

WCDMA/HSPA, Frequency: 2132.4 MHz

Input



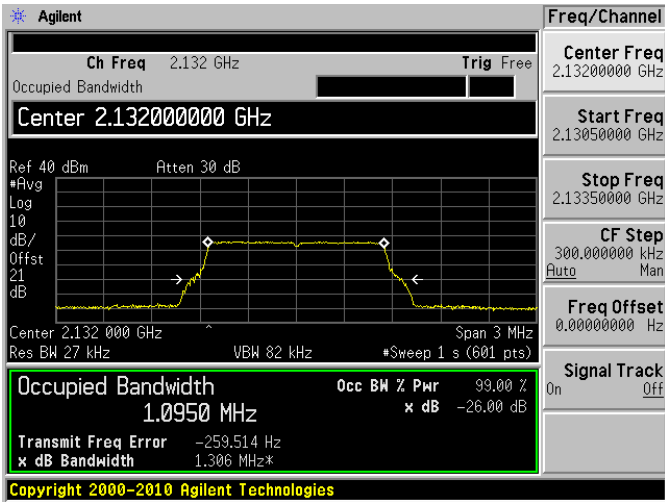
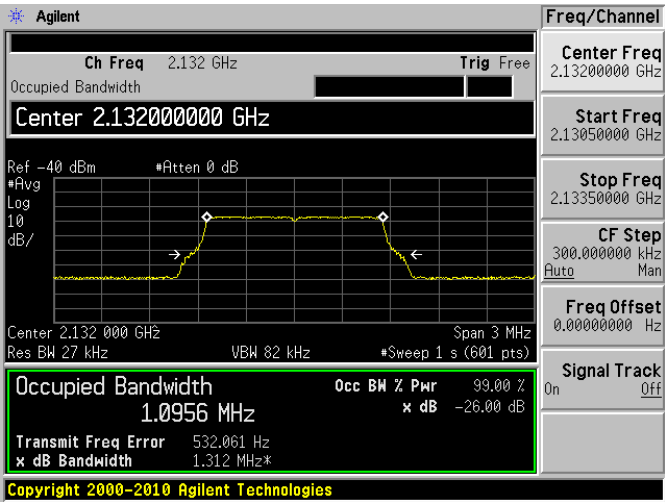
Output



Modulation: QPSK (1.4 MHz), Frequency: 2132 MHz

Input

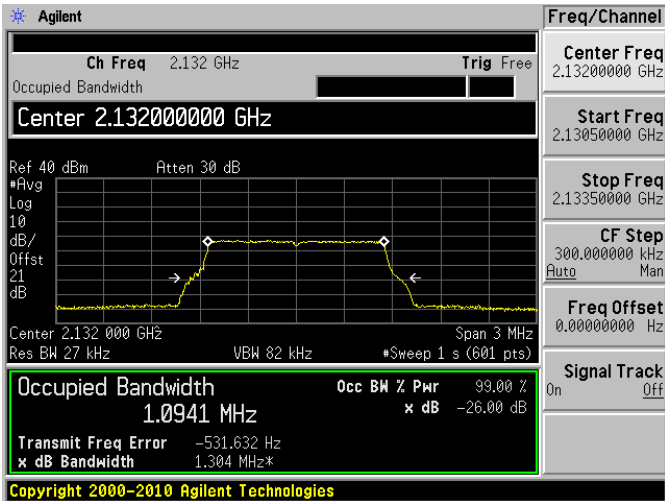
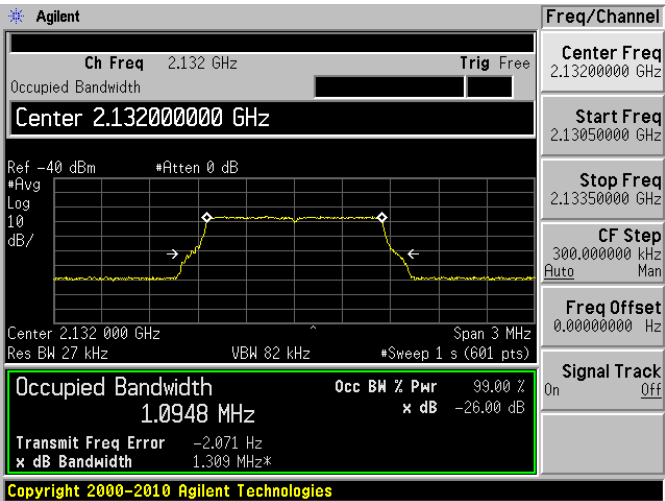
Output



Modulation: 16QAM (1.4 MHz), Frequency: 2132 MHz

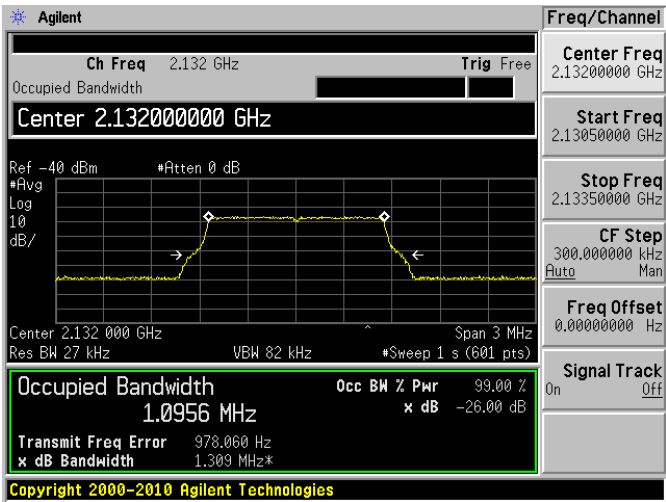
Input

Output

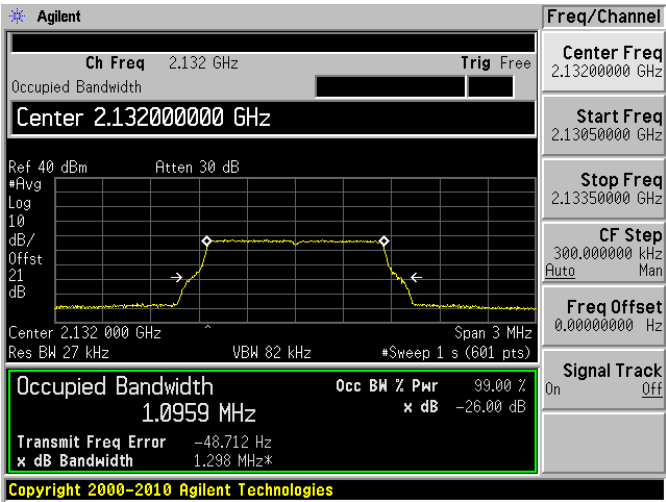


Modulation: 64QAM (1.4 MHz), Frequency: 2132 MHz

Input

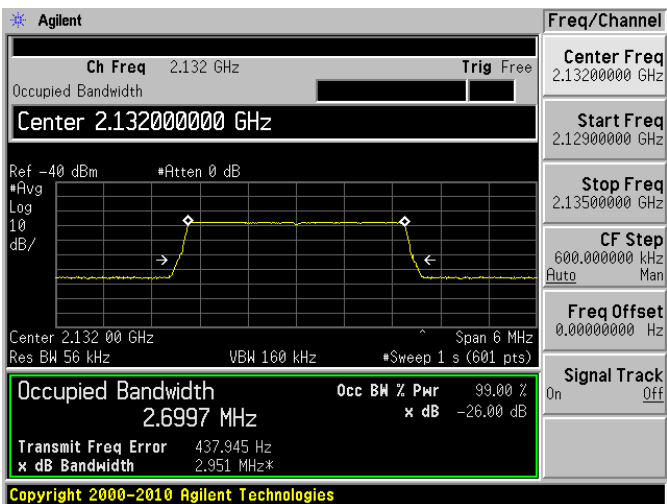


Output

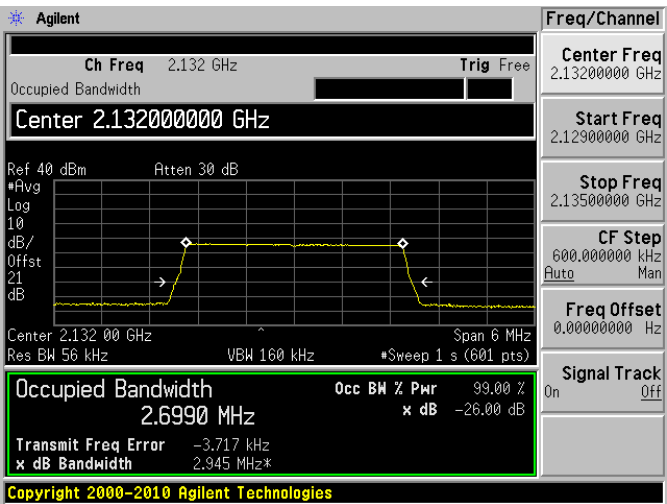


Modulation: QPSK (3 MHz), Frequency: 2132 MHz

Input



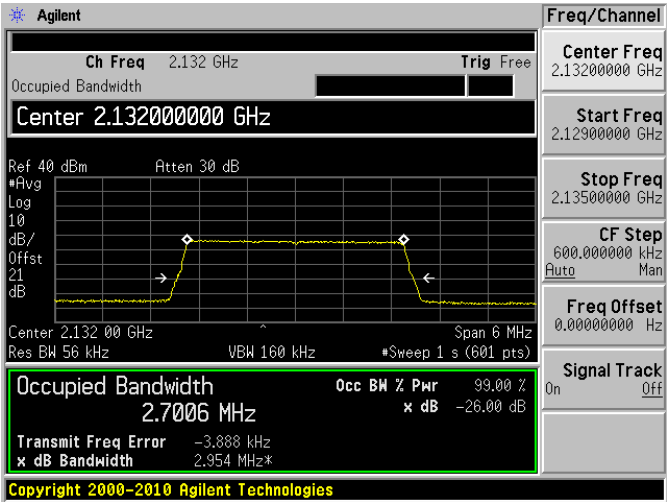
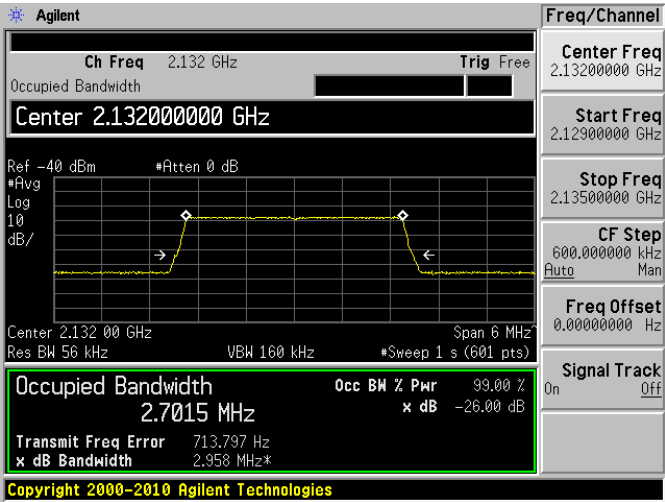
Output



Modulation: 16QAM (3 MHz), Frequency: 2132 MHz

Input

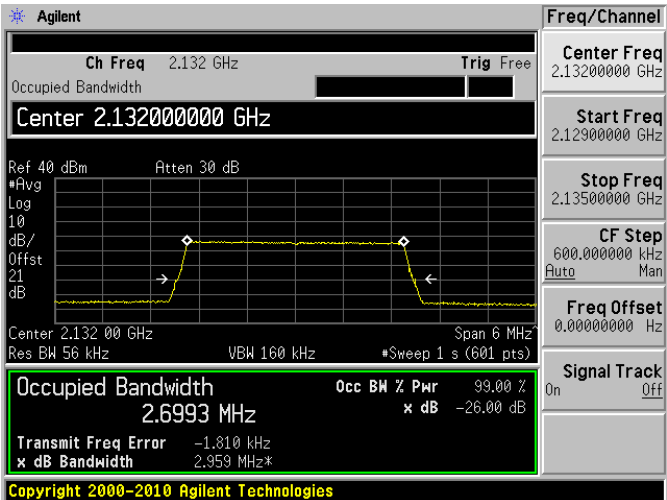
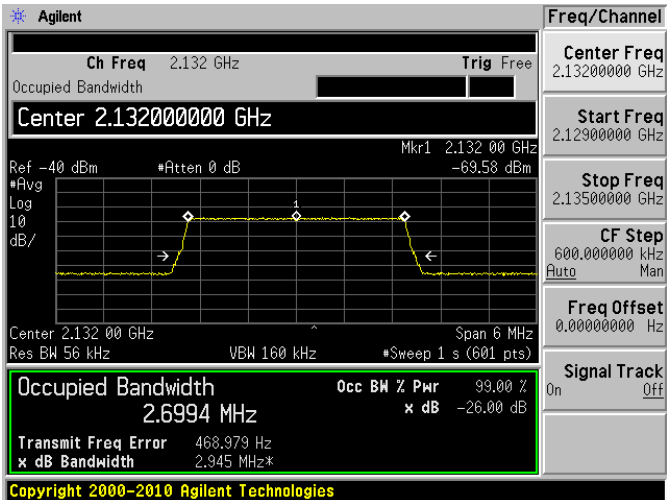
Output



Modulation: 64QAM (3 MHz), Frequency: 2132 MHz

Input

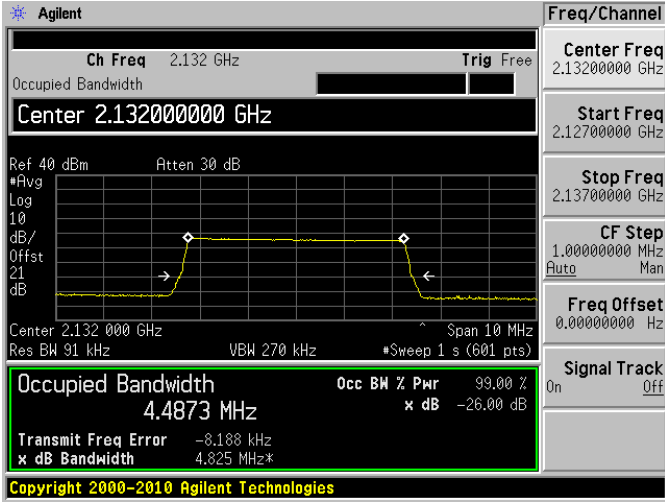
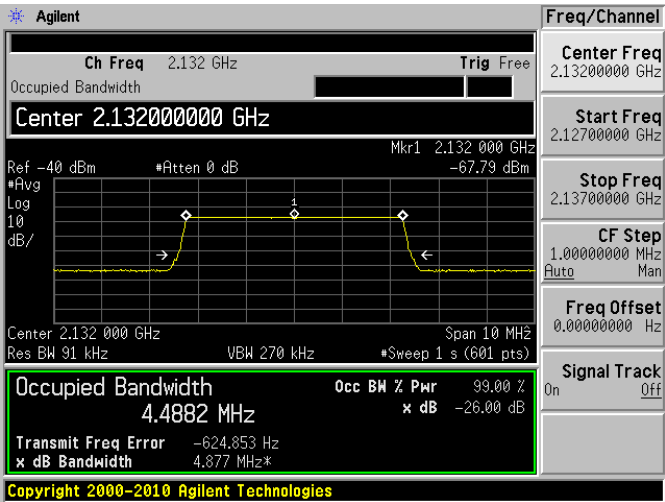
Output



Modulation: QPSK (5 MHz), Frequency: 2132 MHz

Input

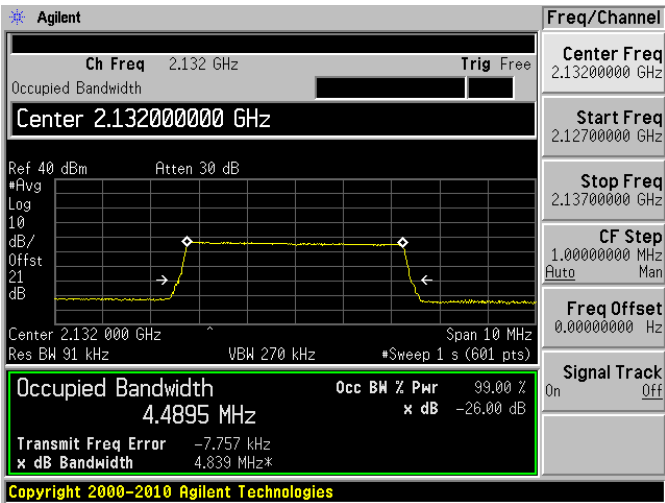
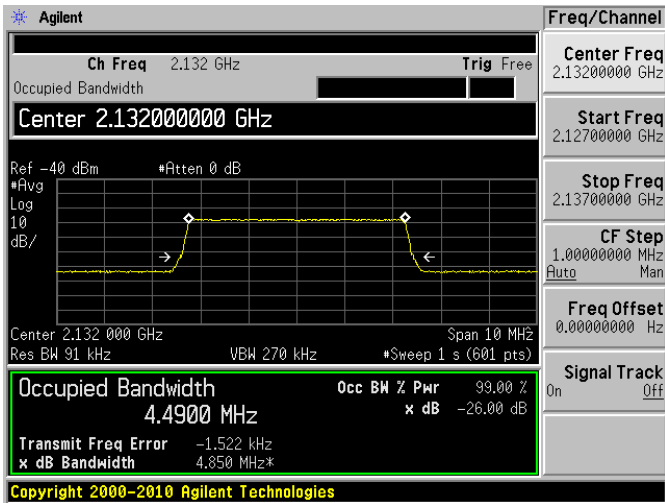
Output



Modulation: 16QAM (5 MHz), Frequency: 2132 MHz

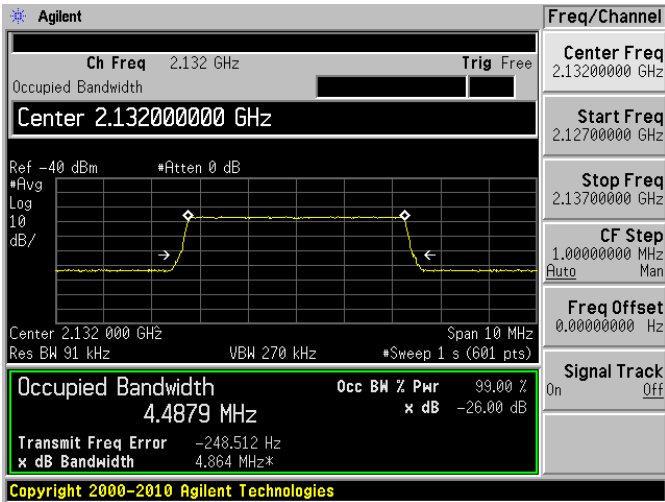
Input

Output

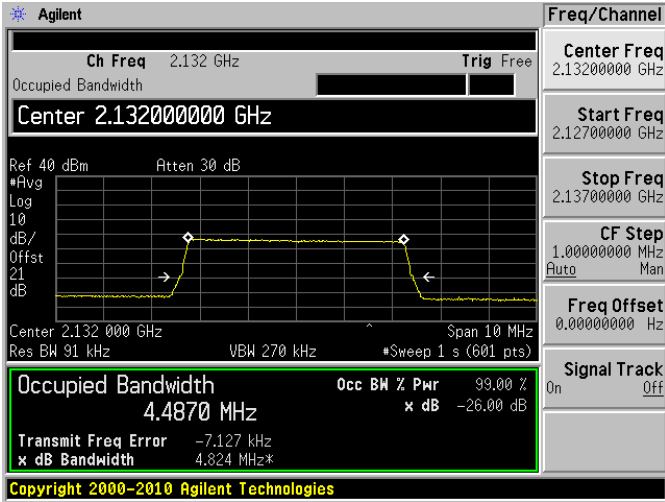


Modulation: 64 (5 MHz), Frequency: 2132 MHz

Input

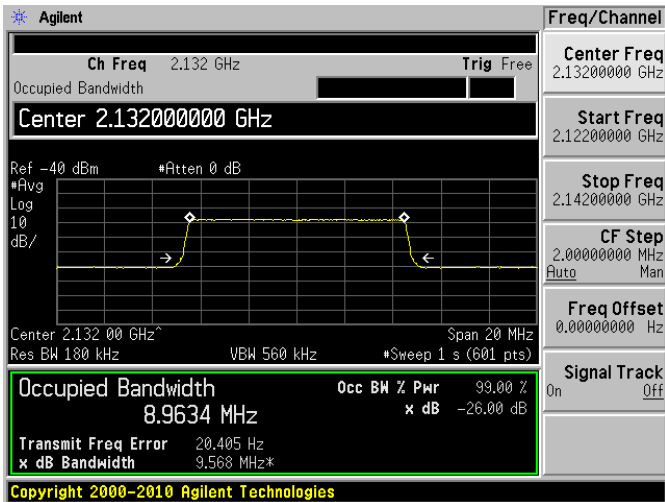


Output

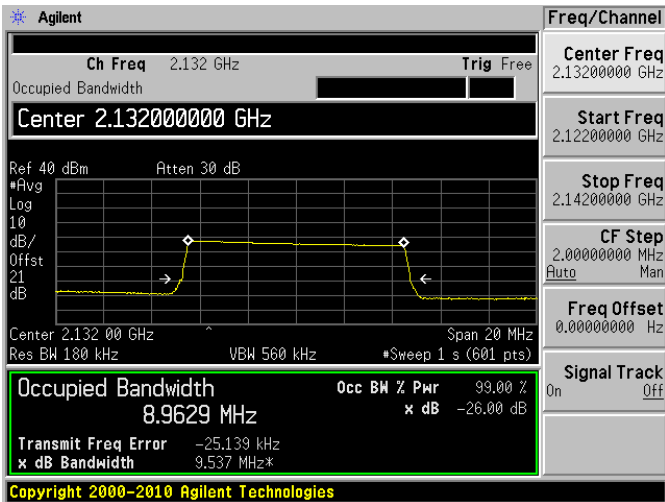


Modulation: QPSK (10 MHz), Frequency: 2132 MHz

Input



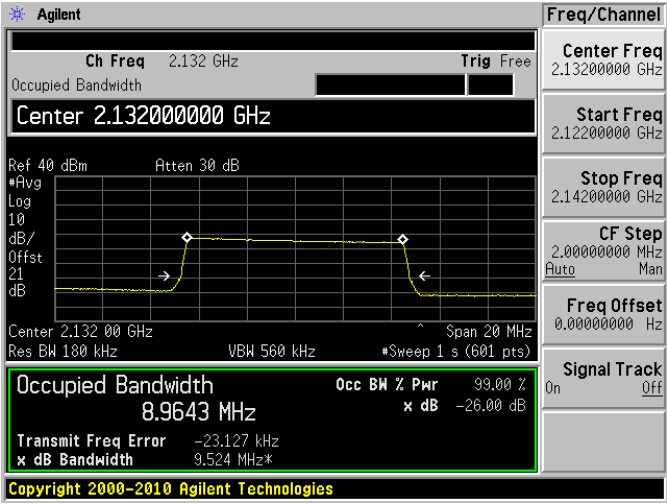
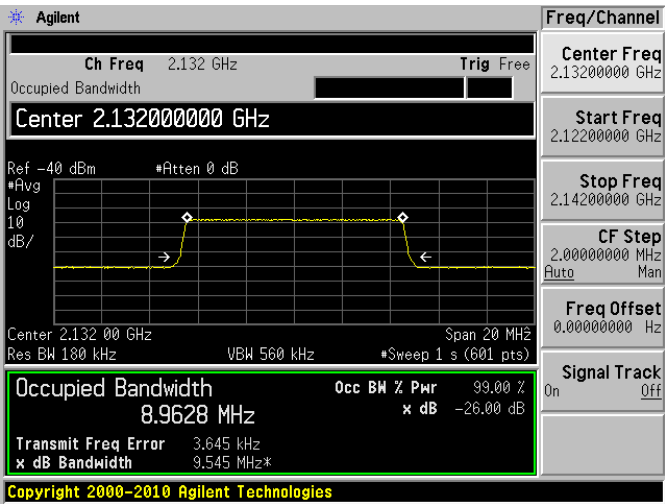
Output



Modulation: QPSK (10 MHz), Frequency: 2132 MHz

Input

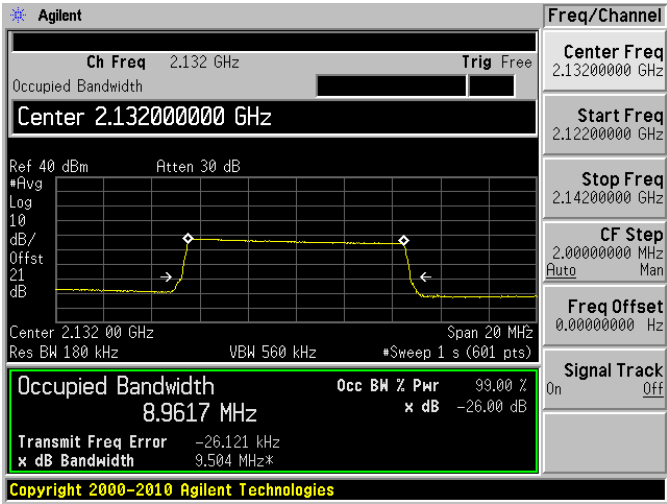
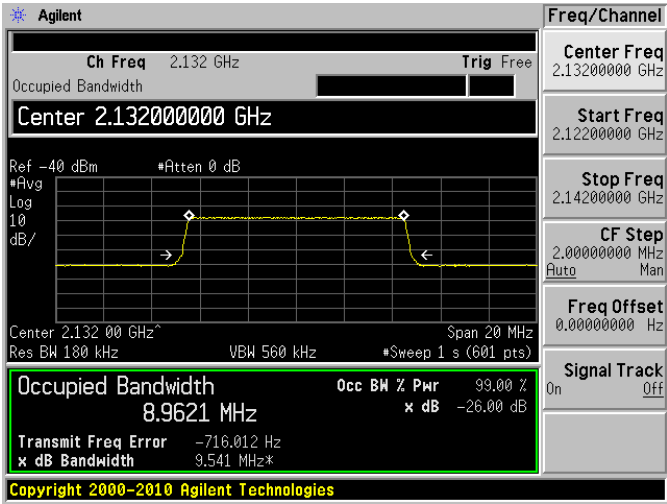
Output



Modulation: 16QAM (10 MHz), Frequency: 2132 MHz

Input

Output



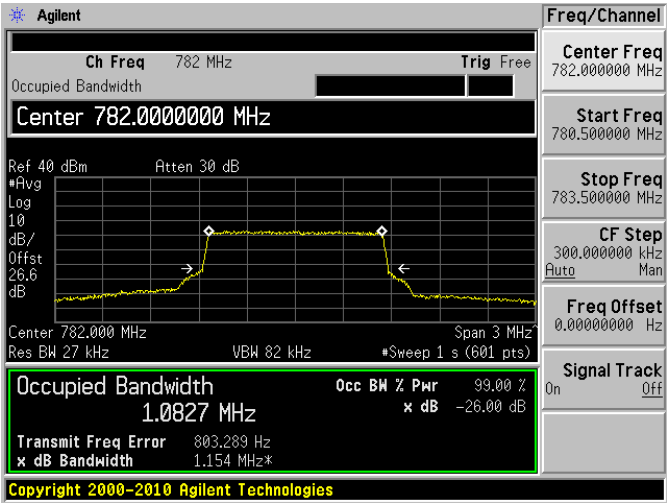
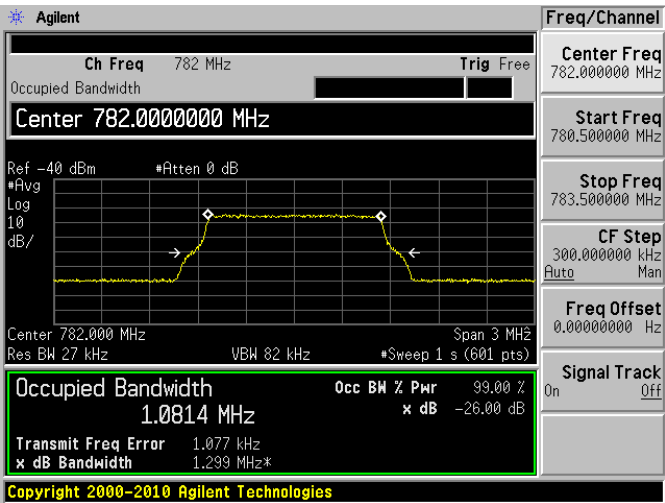
LTE Band (Band 13)

Uplink: 776-787 MHz

Modulation: QPSK (1.4 MHz), Frequency: 782 MHz

Input

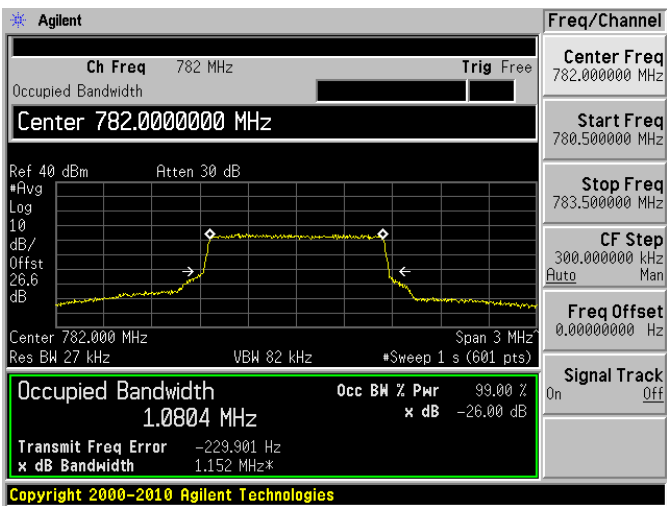
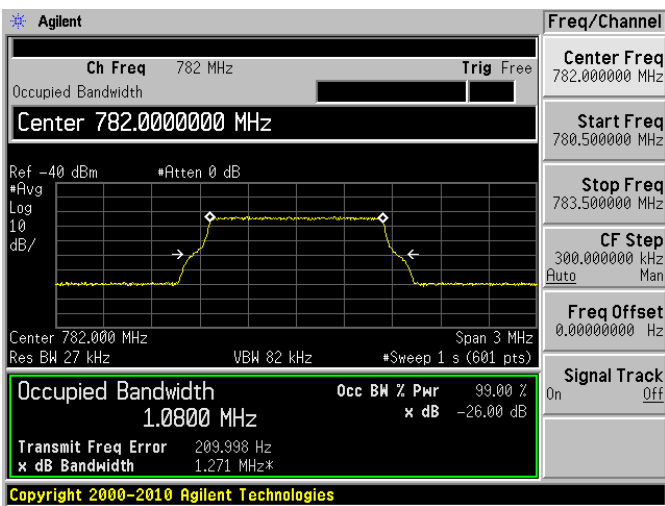
Output



Modulation: 16QAM (1.4 MHz), Frequency: 782 MHz

Input

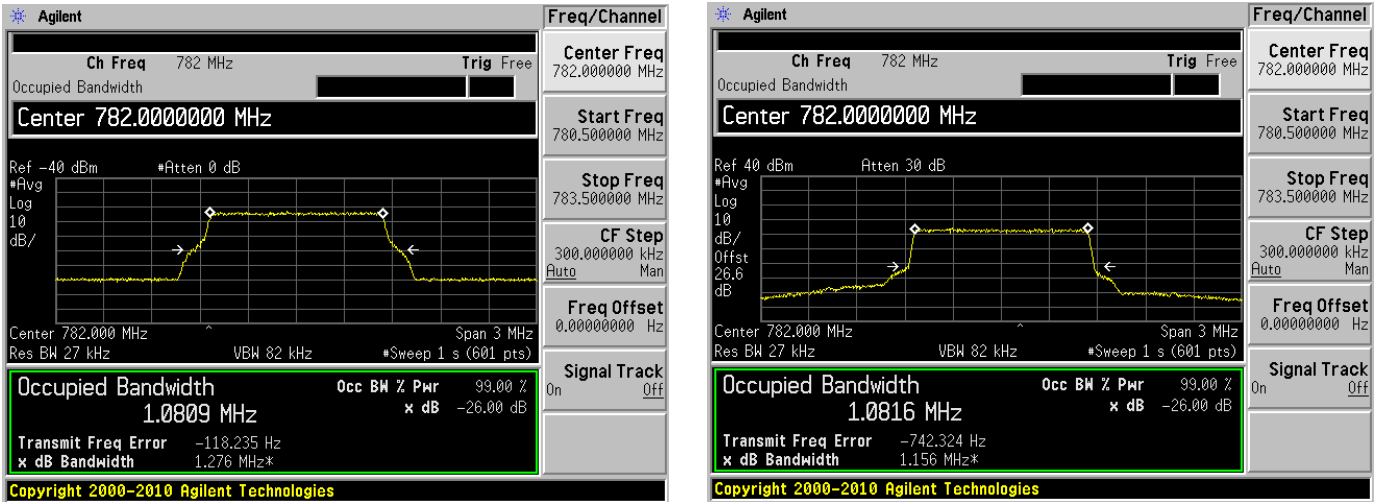
Output



Modulation: 64QAM (1.4 MHz), Frequency: 782 MHz

Input

Output



Modulation: QPSK (3 MHz), Frequency: 782 MHz

Input

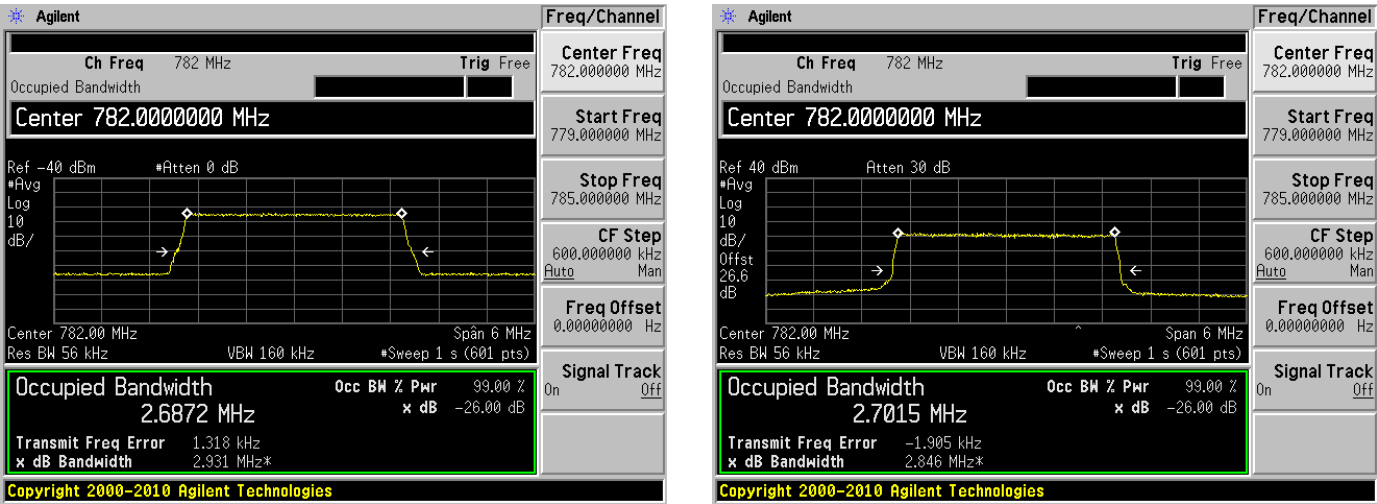
Output



Modulation: 16QAM (3 MHz), Frequency: 782 MHz

Input

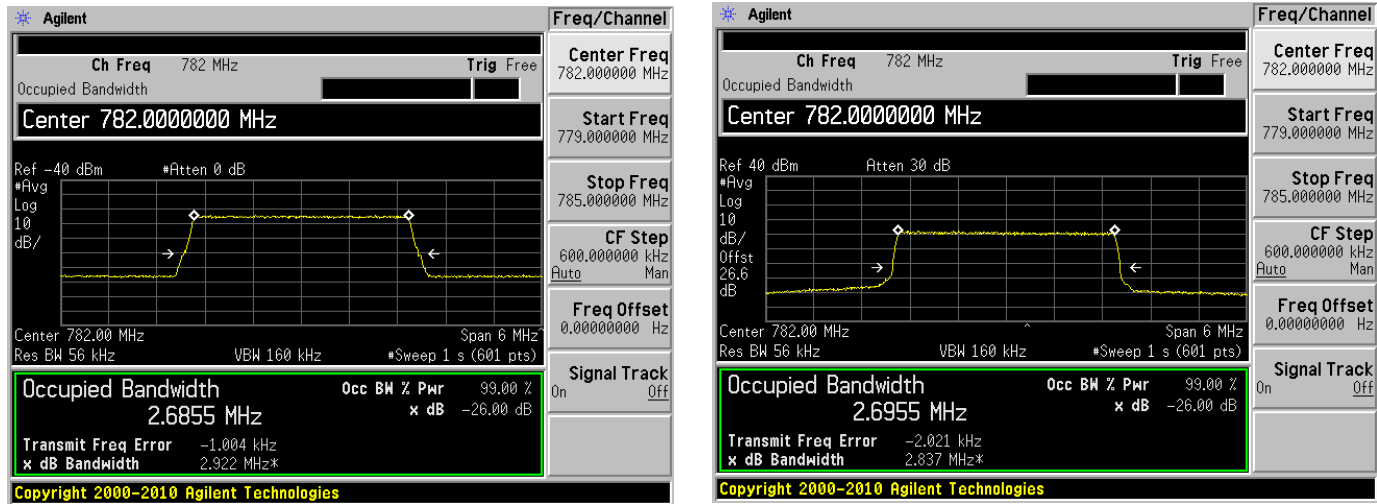
Output



Modulation: 64QAM (3 MHz), Frequency: 782 MHz

Input

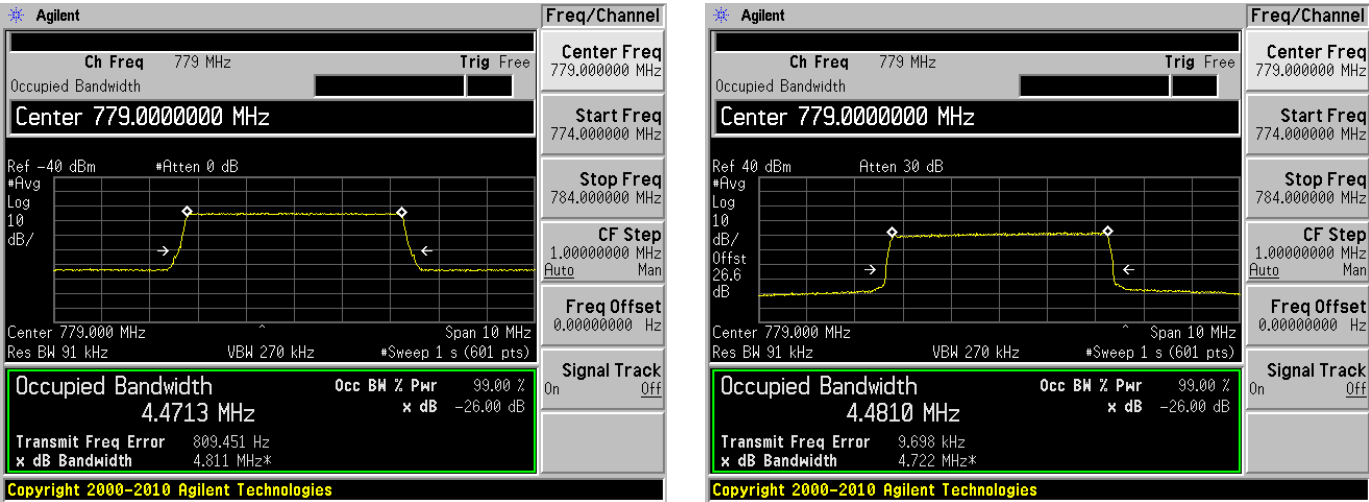
Output



Modulation: QPSK (5 MHz), Frequency: 779 MHz

Input

Output



Modulation: 16QAM (5 MHz), Frequency: 779 MHz

Input

Output



Modulation: 64QAM (5 MHz), Frequency: 779 MHz

Input

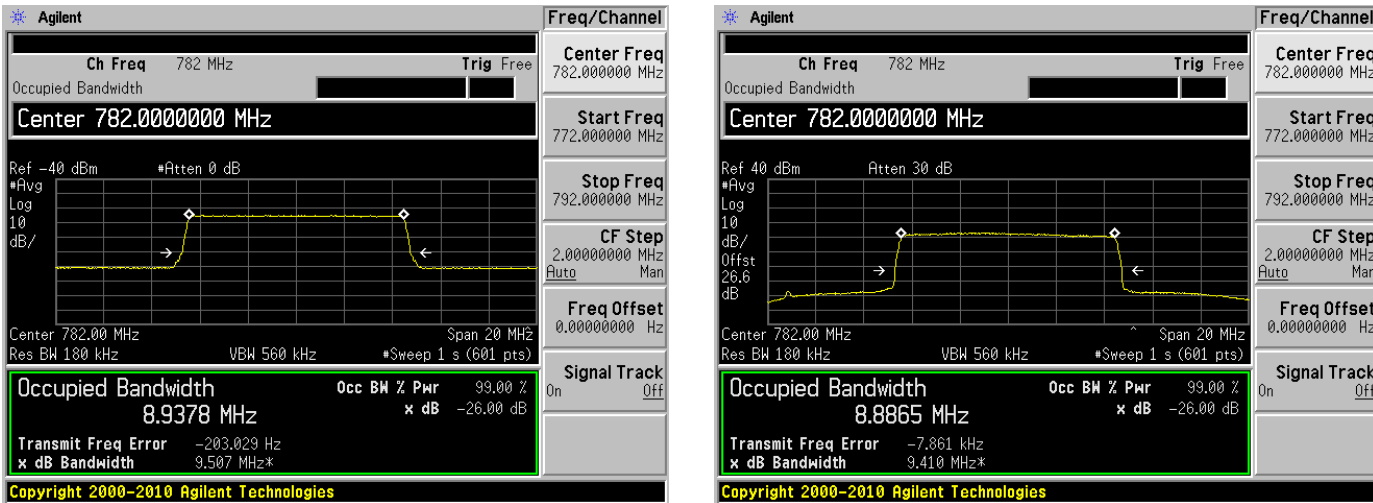
Output



Modulation: QPSK (10 MHz), Frequency: 782 MHz

Input

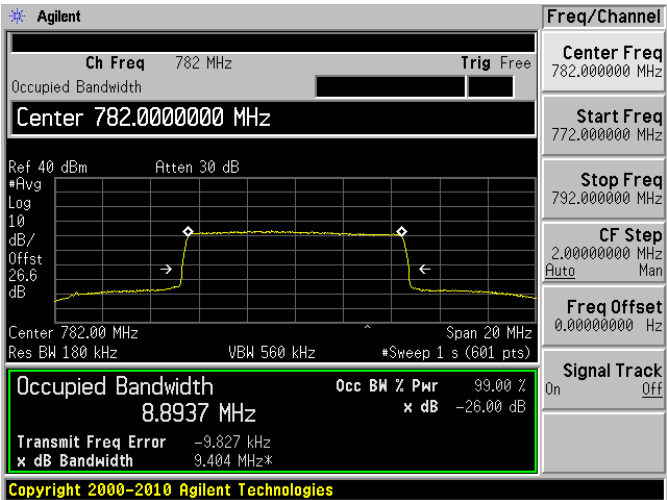
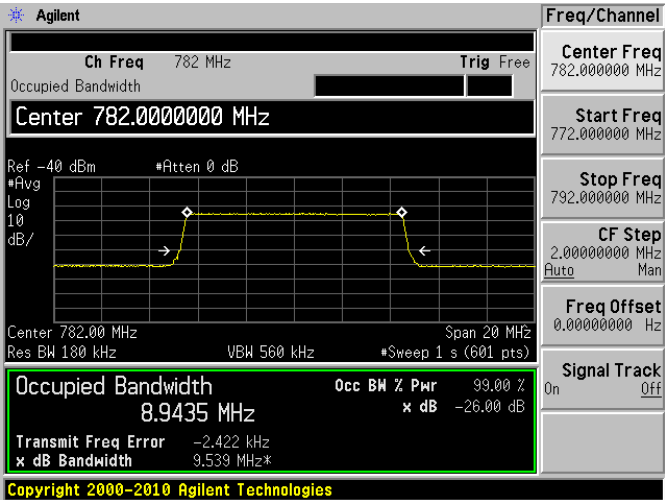
Output



Modulation: 16QAM (10 MHz), Frequency: 782 MHz

Input

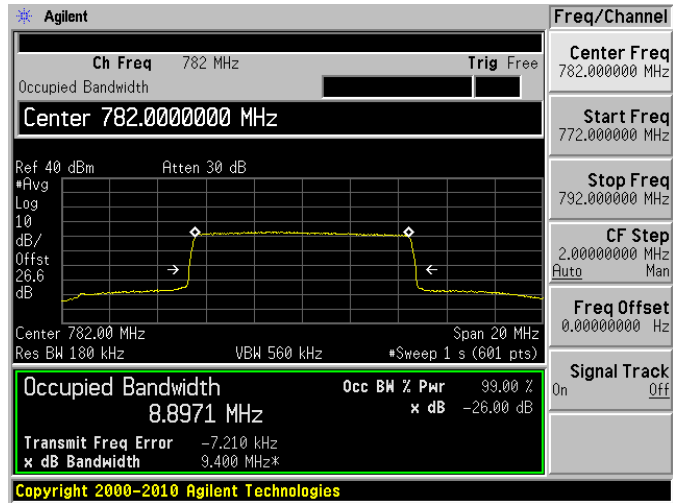
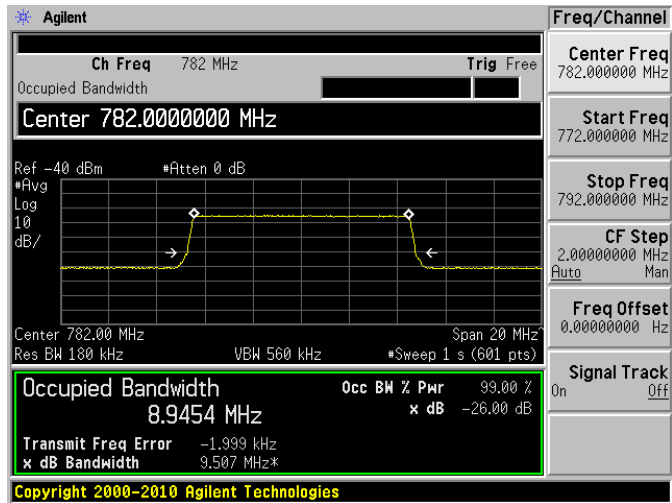
Output



Modulation: 64QAM (10 MHz), Frequency: 782 MHz

Input

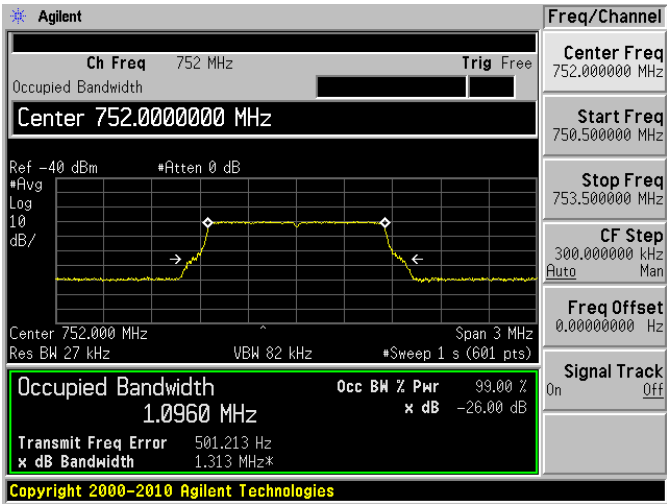
Output



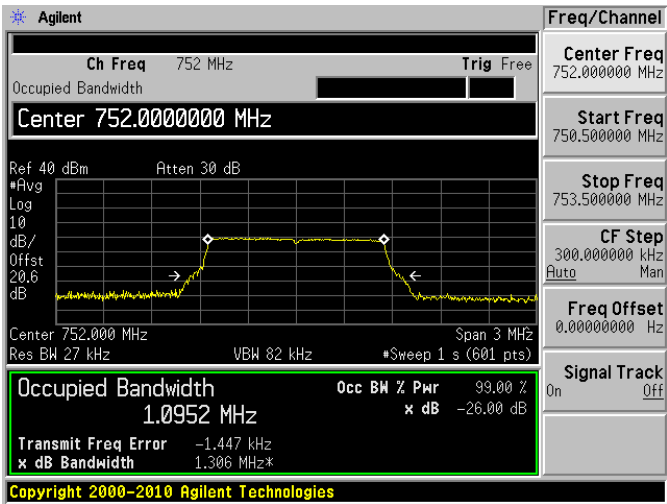
Downlink: 746-757 MHz

Modulation: QPSK (1.4 MHz), Frequency: 752 MHz

Input

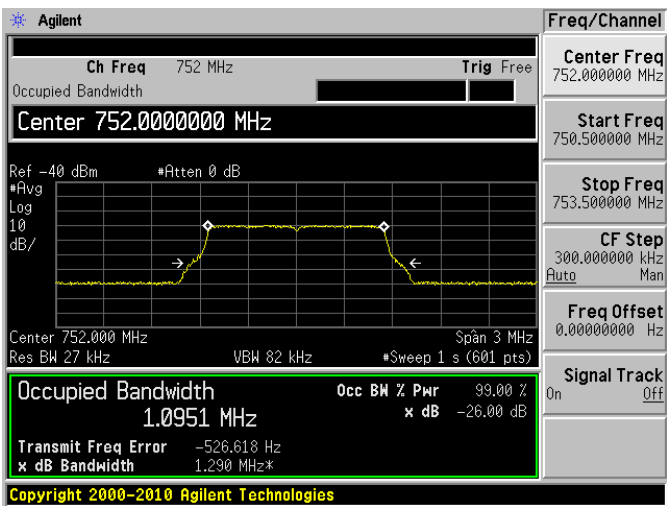


Output

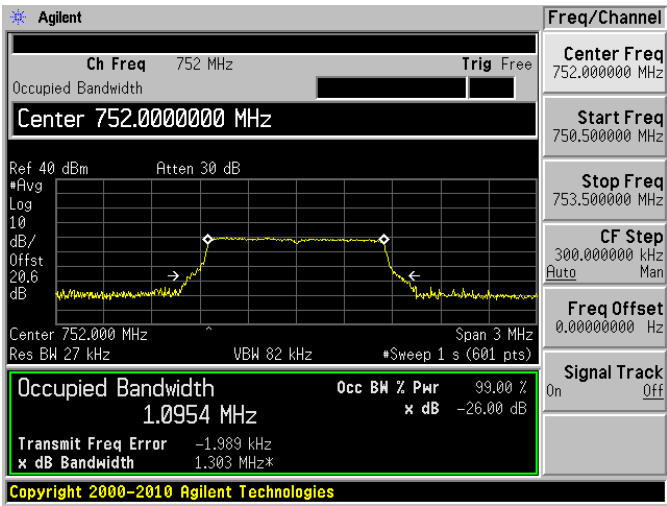


Modulation: 16QAM (1.4 MHz), Frequency: 752 MHz

Input



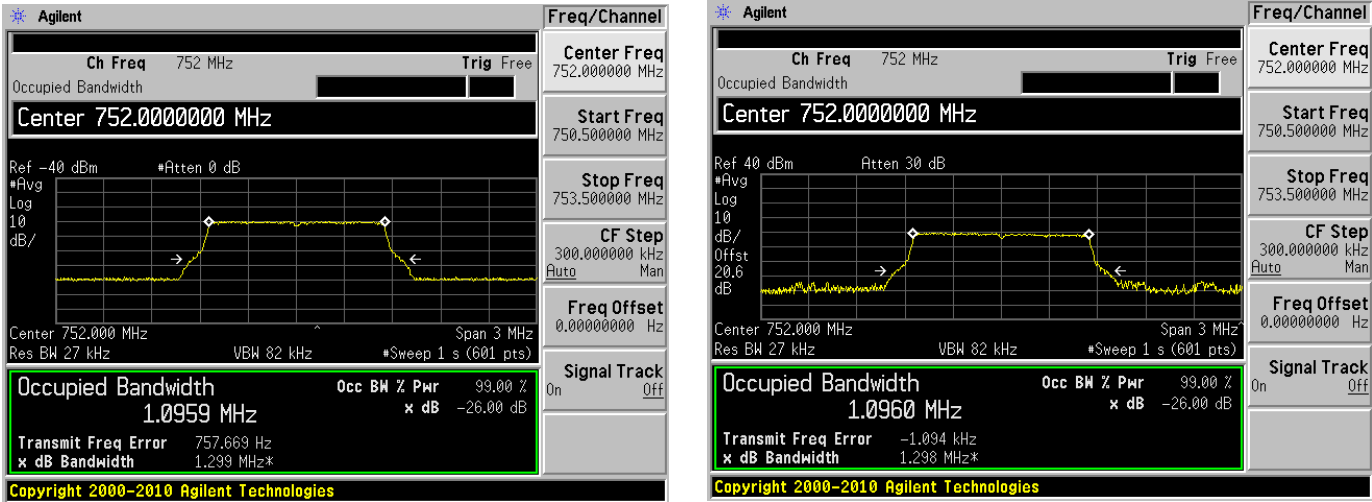
Output



Modulation: 64QAM (1.4 MHz), Frequency: 752 MHz

Input

Output



Modulation: QPSK (3 MHz), Frequency: 752 MHz

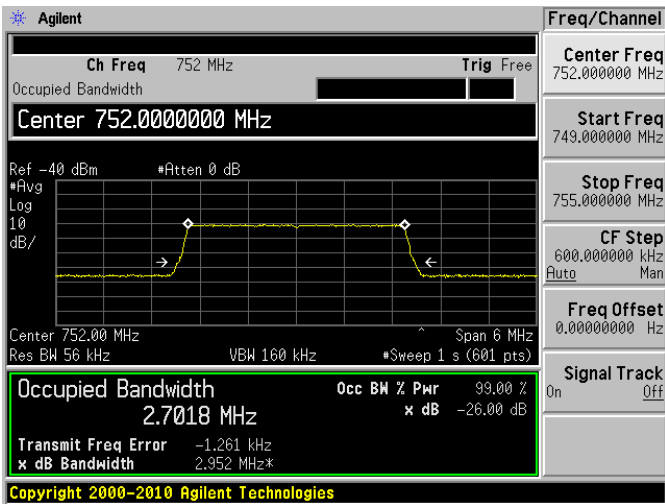
Input

Output

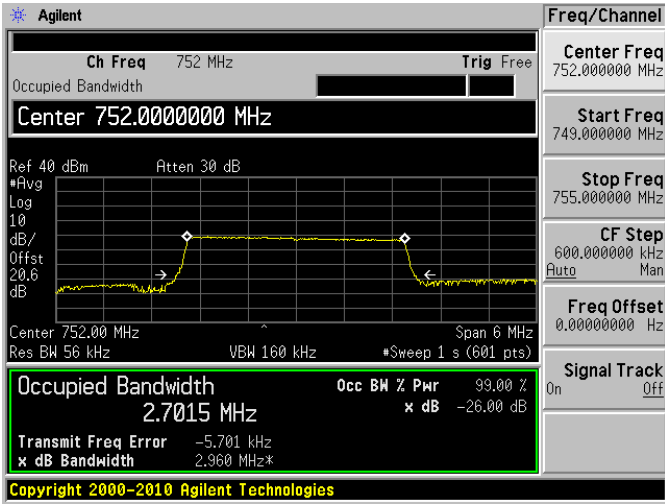


Modulation: 16QAM (3 MHz), Frequency: 752 MHz

Input

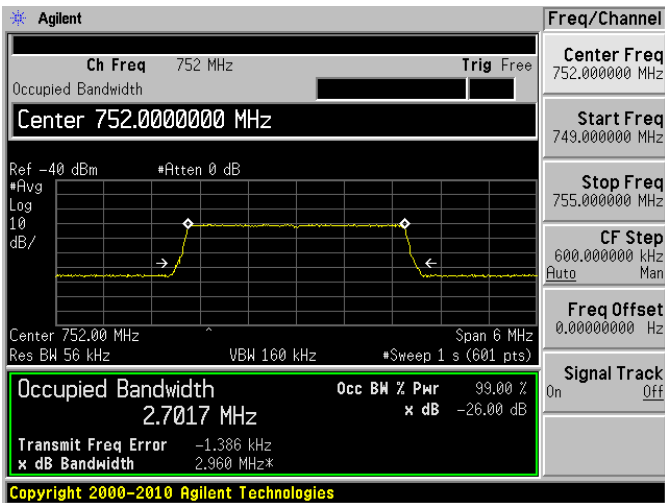


Output

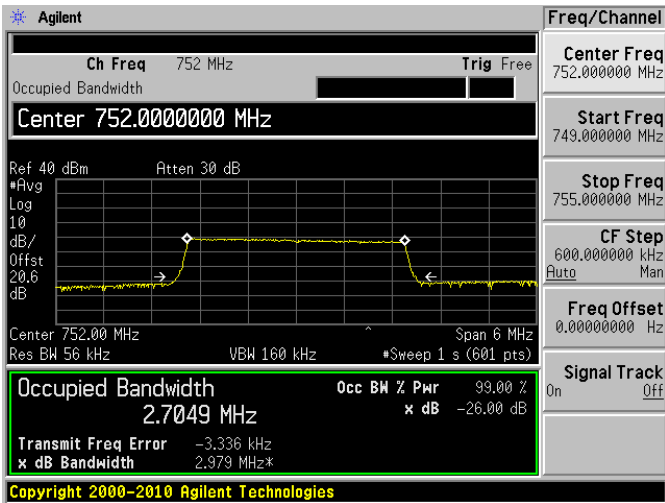


Modulation: 64QAM (3 MHz), Frequency: 752 MHz

Input

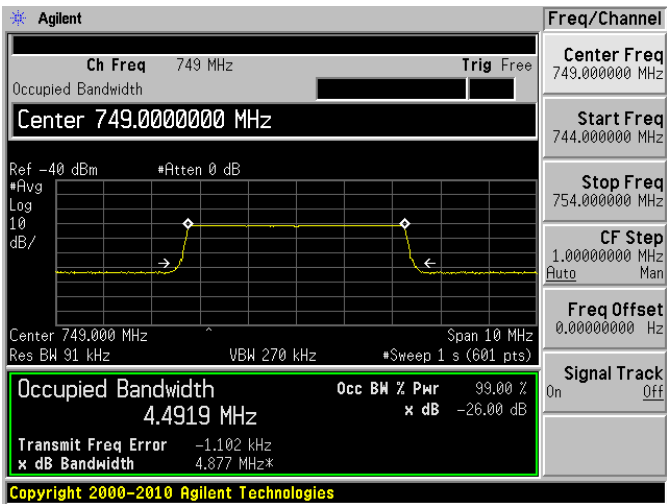


Output

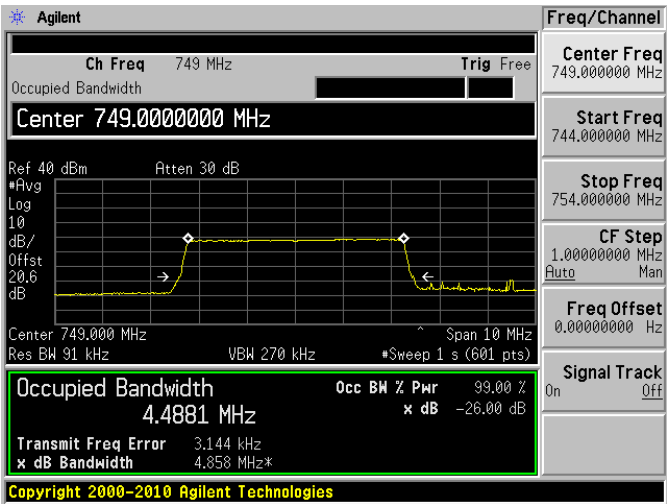


Modulation: QPSK (5 MHz), Frequency: 749 MHz

Input

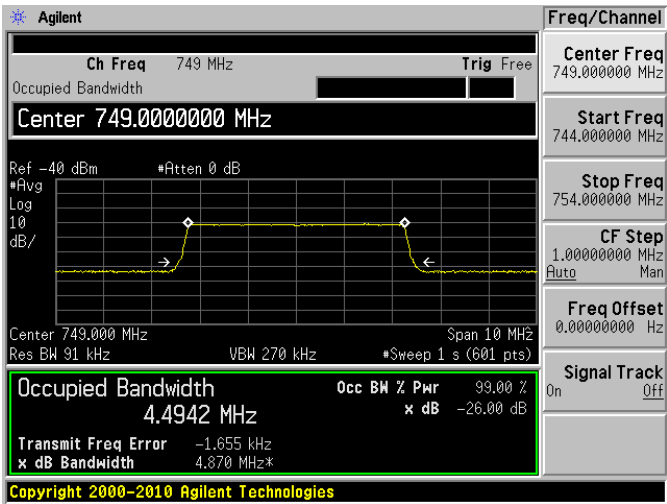


Output

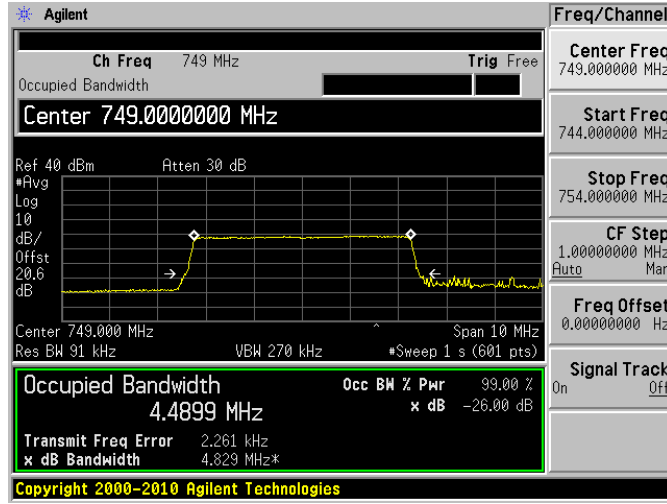


Modulation: 16QAM (5 MHz), Frequency: 749 MHz

Input



Output



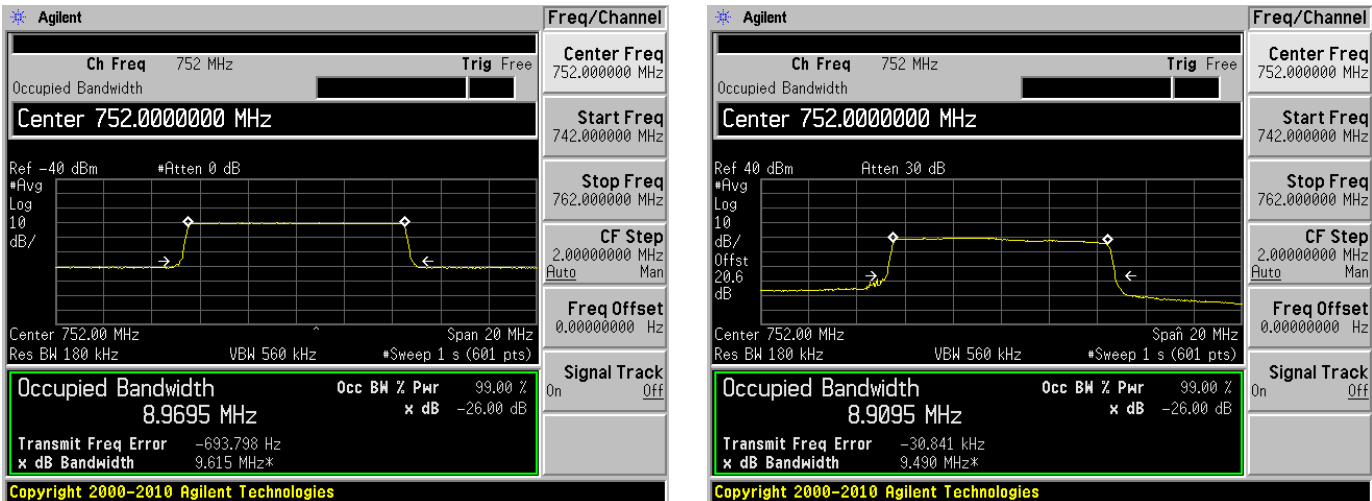
Modulation: 64QAM (5 MHz), Frequency: 749 MHz

InputOutput



Modulation: QPSK (10 MHz), Frequency: 752 MHz

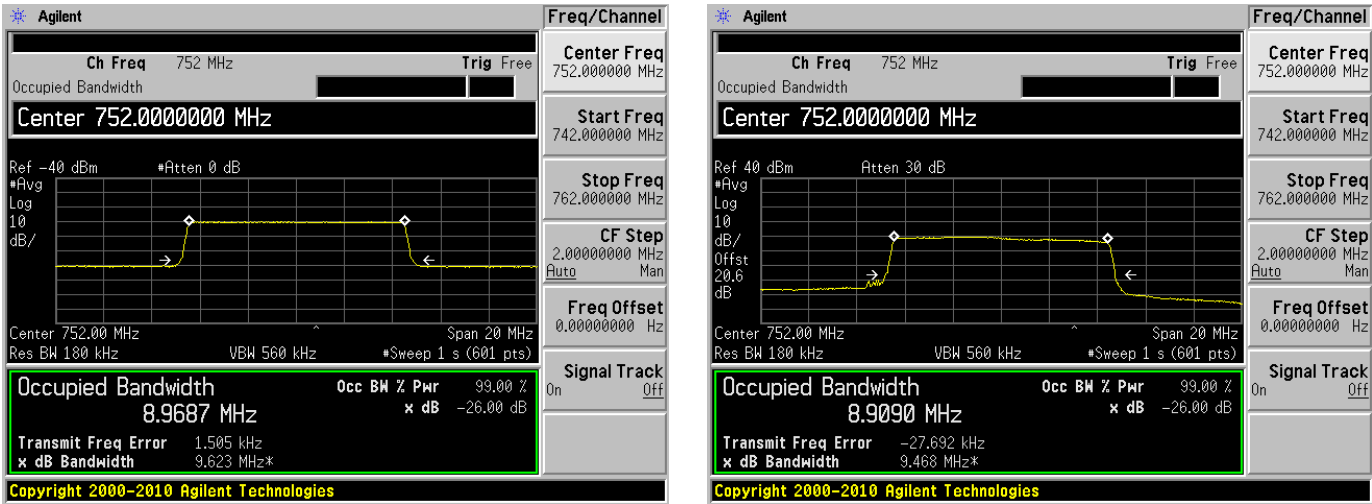
InputOutput



Modulation: 16QAM (10 MHz), Frequency: 752 MHz

Input

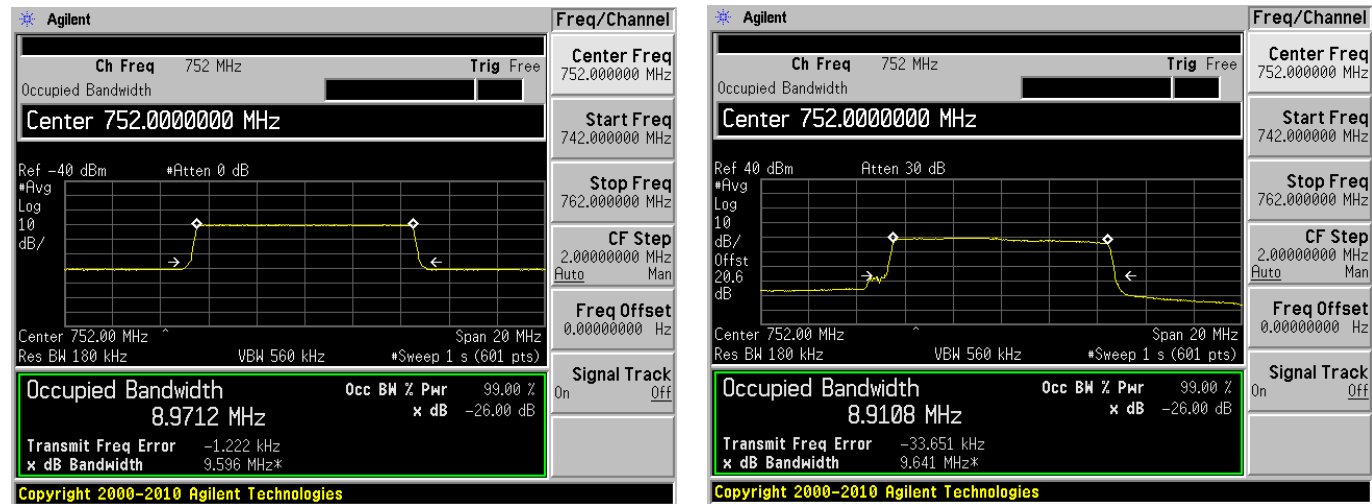
Output



Modulation: 64QAM (10 MHz), Frequency: 752 MHz

Input

Output



6 FCC §2.1051 & §27.53 - SPURIOUS RADIATED EMISSIONS

6.1 Applicable Standard

Requirements: FCC §2.1051, §27.53.

6.2 Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to tenth harmonic of the fundamental frequency was investigated. Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB = $10 \log (\text{TX Power in Watts}/0.001)$ – the absolute level

Spurious attenuation limit in dB = $43 + 10 \log_{10} (\text{power out in Watts})$

6.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Agilent	Spectrum Analyzer	E4440A	MY44303352	2012-05-10
HP	Signal Generator	8648C	3426A00417	2011-08-18
Sunol Science Corp	System Controller	SC99V	122303-1	N/A
Sunol Science Corp	Combination Antenna	JB3	A020106-2	2011-08-10
Hewlett Packard	Pre-amplifier	8447D	2944A06639	2011-06-09
A.R.A Inc	Horn antenna	DRG-1181A	1132	2012-01-04

Statement of Traceability: BACL Corp. attests that all calibrations have been performed according to A2LA requirements, traceable to the NIST.

6.4 Test Environmental Conditions

Temperature:	21-23°C
Relative Humidity:	47-49 %
ATM Pressure:	101-102 kPa

The testing was performed by Jeffrey Wu from 2012-06-04 to 2012-06-07 at Chamber #3.

6.5 Summary of Test Results

The worst case reading as follows:

Frequency Bands	Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Frequency Range
DL: 746-757 MHz	-48.5	1504	Horizontal	30 MHz – 10 GHz
UL: 776-787 MHz	-37.3	4674	Horizontal	30 MHz – 10 GHz

6.6 Test Results

AWS Band (Band 4)

Below 1 GHz

Uplink (Input frequency = 1732 MHz) – CW Signal

Indicated		Turntable Azimuth (degree)	Test Antenna		Substituted					Limit (dBm)	Margin (dB)
Frequency (MHz)	S.A. Amp. (dBuV)		Height (cm)	Polarity (H/V)	Frequency (MHz)	Level (dBm)	Ant. Gain Correction (dB)	Cable Loss (dB)	Absolute Level (dBm)		
-	-	-	-	H	-	-	-	-	-	-13	Note
-	-	-	-	V	-	-	-	-	-	-13	Note

Downlink (Input frequency = 2112.4 MHz) – CW Signal

Indicated		Turntable Azimuth (degree)	Test Antenna		Substituted					Limit (dBm)	Margin (dB)
Frequency (MHz)	S.A. Amp. (dBuV)		Height (cm)	Polarity (H/V)	Frequency (MHz)	Level (dBm)	Ant. Gain Correction (dB)	Cable Loss (dB)	Absolute Level (dBm)		
-	-	-	-	H	-	-	-	-	-	-13	Note
-	-	-	-	V	-	-	-	-	-	-13	Note

Above 1 GHz

Uplink (Input frequency = 1732 MHz) – CW Signal

Indicated		Turntable Azimuth (degree)	Test Antenna		Substituted					Limit (dBm)	Margin (dB)
Frequency (MHz)	S.A. Amp. (dBuV)		Height (cm)	Polarity (H/V)	Frequency (MHz)	Level (dBm)	Ant. Gain Correction (dB)	Cable Loss (dB)	Absolute Level (dBm)		
3460	46.85	213	152	H	3460	-49.65	9.33	1.3	-41.62	-13	-28.62
3460	45.39	199	236	V	3460	-51.11	9.33	1.3	-43.08	-13	-30.08

Downlink (Input frequency = 2112.4 MHz) – CW Signal

Indicated		Turntable Azimuth (degree)	Test Antenna		Substituted					Limit (dBm)	Margin (dB)
Frequency (MHz)	S.A. Amp. (dBuV)		Height (cm)	Polarity (H/V)	Frequency (MHz)	Level (dBm)	Ant. Gain Correction (dB)	Cable Loss (dB)	Absolute Level (dBm)		
-	-	-	-	H	-	-	-	-	-	-13	Note
-	-	-	-	V	-	-	-	-	-	-13	Note

Note: - All emissions are on/under noise floor level.

LTE Band (Band 13)

Below 1 GHz

Uplink (Input frequency = 779 MHz) – CW Signal

Indicated		Turntable Azimuth (degree)	Test Antenna		Substituted					Limit (dBm)	Margin (dB)
Frequency (MHz)	S.A. Amp. (dBuV)		Height (cm)	Polarity (H/V)	Frequency (MHz)	Level (dBm)	Ant. Gain Correction (dB)	Cable Loss (dB)	Absolute Level (dBm)		
-	-	-	-	H	-	-	-	-	-	-13	Note
-	-	-	-	V	-	-	-	-	-	-13	Note

Downlink (Input frequency = 752 MHz) – CW Signal

Indicated		Turntable Azimuth (degree)	Test Antenna		Substituted					Limit (dBm)	Margin (dB)
Frequency (MHz)	S.A. Amp. (dBuV)		Height (cm)	Polarity (H/V)	Frequency (MHz)	Level (dBm)	Ant. Gain Correction (dB)	Cable Loss (dB)	Absolute Level (dBm)		
-	-	-	-	H	-	-	-	-	-	-13	Note
-	-	-	-	V	-	-	-	-	-	-13	Note

Above 1 GHz

Uplink (Input frequency = 1732 MHz) – CW Signal

Indicated		Turntable Azimuth (degree)	Test Antenna		Substituted					Limit (dBm)	Margin (dB)
Frequency (MHz)	S.A. Amp. (dBuV)		Height (cm)	Polarity (H/V)	Frequency (MHz)	Level (dBm)	Ant. Gain Correction (dB)	Cable Loss (dB)	Absolute Level (dBm)		
2337	50.22	185	144	H	2337	-49.52	9.41	1.3	-41.41	-13	-28.41
2337	45.44	145	278	V	2337	-54.3	9.41	1.3	-46.19	-13	-33.19
4674	45.61	223	100	H	4674	-47.1	11.4	2	-37.7	-13	-24.7
4674	43.12	118	100	V	4674	-49.59	11.4	2	-40.19	-13	-27.19

Downlink (Input frequency = 2112.4 MHz) – CW Signal

Indicated		Turntable Azimuth (degree)	Test Antenna		Substituted					Limit (dBm)	Margin (dB)
Frequency (MHz)	S.A. Amp. (dBuV)		Height (cm)	Polarity (H/V)	Frequency (MHz)	Level (dBm)	Ant. Gain Correction (dB)	Cable Loss (dB)	Absolute Level (dBm)		
-	-	-	-	H	-	-	-	-	-	-13	Note
-	-	-	-	V	-	-	-	-	-	-13	Note

Note: - All emissions are on/under noise floor level.

7 FCC §2.1051 & §27.53 – SPURIOUS EMISSIONS AT ANTENNA TERMINALS

7.1 Applicable Standard

Requirements: FCC §2.1051 & §27.53.

The spectrum shall be investigated to the tenth harmonics of the highest fundamental frequency as specified in § 2.1057.

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log (P)$ dB

7.2 Test Procedure

The RF output of the transceiver was connected to a spectrum analyzer and simulator through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100 kHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonic.

7.3 Test Equipment List and Details

Manufacturers	Descriptions	Models	Serial Numbers	Calibration Dates
Agilent	Spectrum Analyzer	E4440A	MY44303352	2012-05-10
HP	Signal Generator	8648C	3426A00417	2011-08-18
Agilent	Signal Generator	E4438C	MY45091309	2012-05-03

Statement of Traceability: BACL Corp. attests that all calibrations have been performed according to A2LA requirements, traceable to the NIST.

7.4 Test Environmental Conditions

Temperature:	23°C
Relative Humidity:	47 %
ATM Pressure:	101.2 kPa

The testing was performed by Jeffrey Wu on 2012-06-05 at RF Site.

7.5 Test Results

Please refer to the following plots.

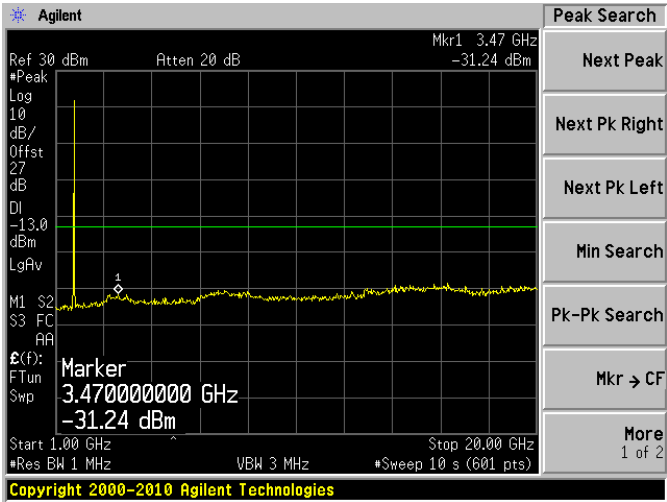
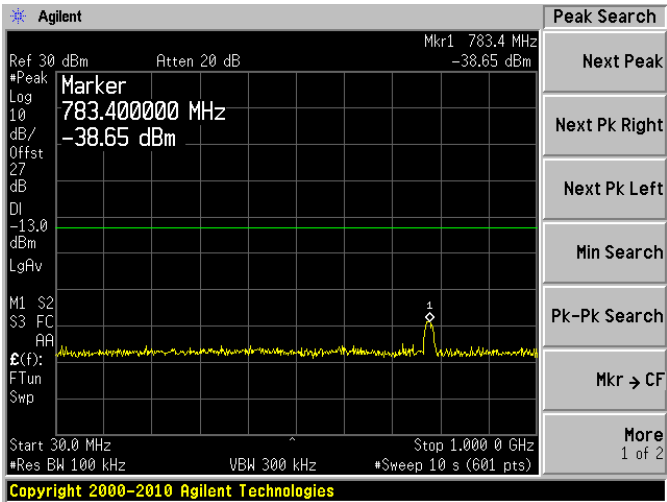
AWS Band (Band 4)

UL: 1710-1755 MHz

Modulation: CW Signal, Frequency: 1732 MHz

30 MHz to 1 GHz

above 1 GHz

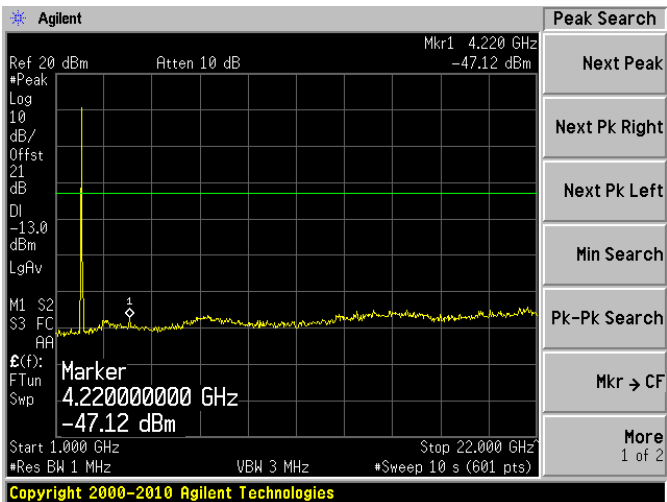
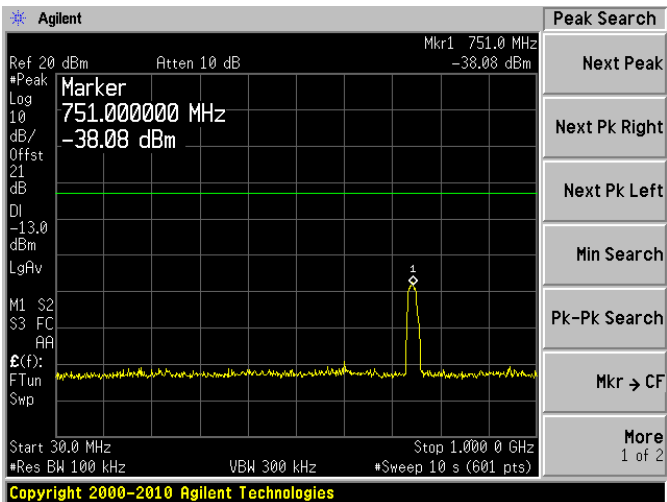


DL: 2110-2155 MHz

Modulation: CW Signal, Frequency: 2112.4 MHz

30 MHz to 1 GHz

above 1 GHz



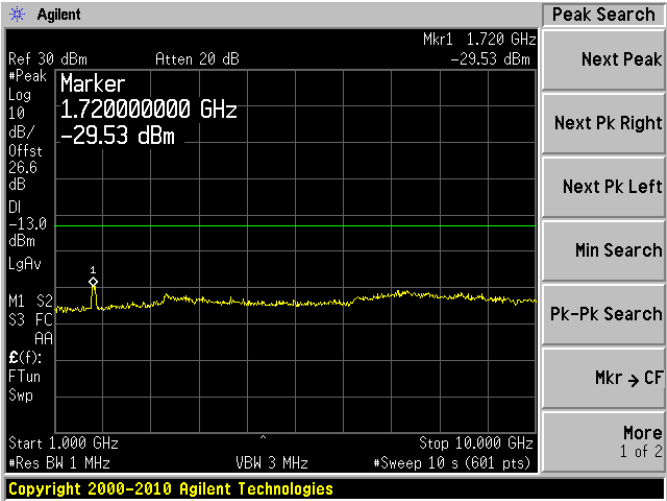
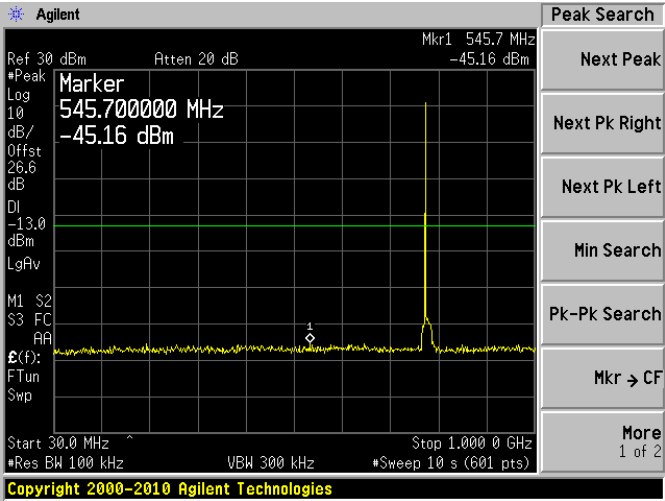
LTE Band (Band 13)

UL: 776-787 MHz

Modulation: CW Signal, Frequency: 779 MHz

30 MHz to 1 GHz

above 1 GHz

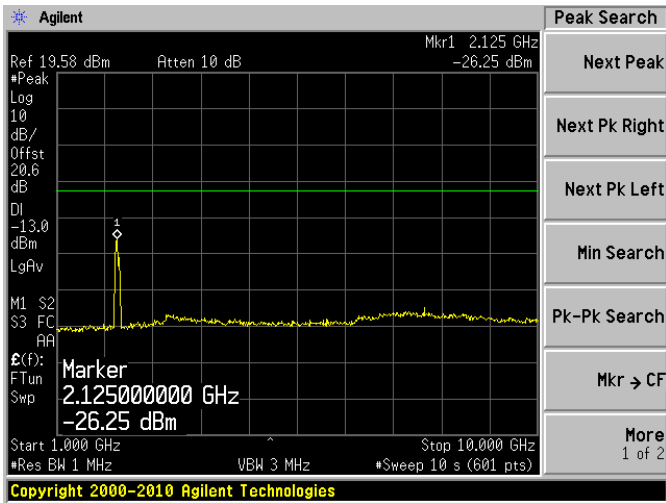
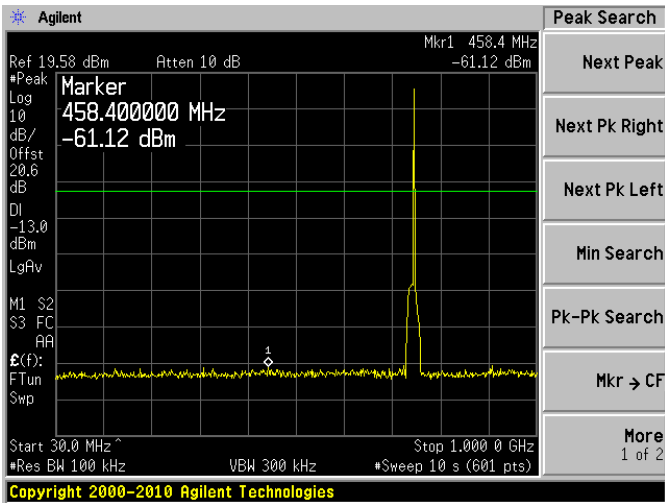


DL: 746-757MHz

Modulation: CW Signal, Frequency: 752 MHz

30 MHz to 1 GHz

above 1 GHz



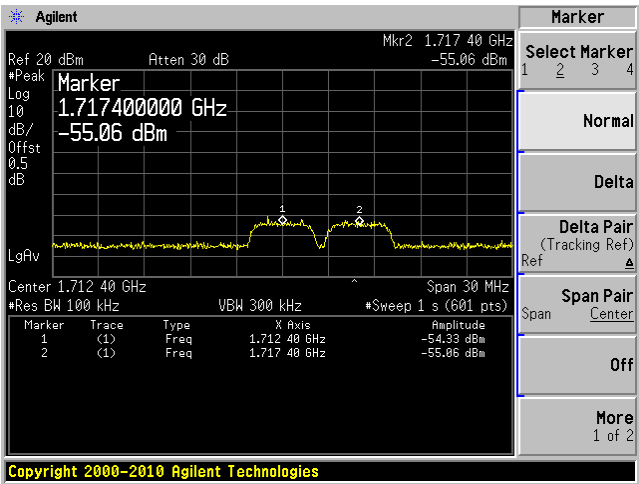
Inter-modulation

AWS Band (Band 4)

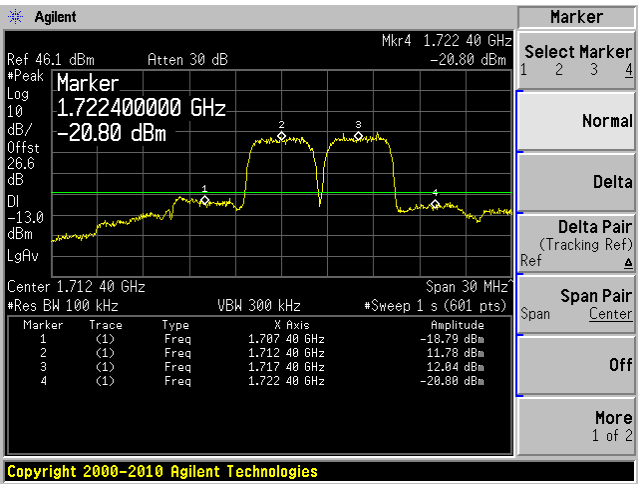
UL: 1710-1755 MHz

Modulation: WCDMA/HSPA

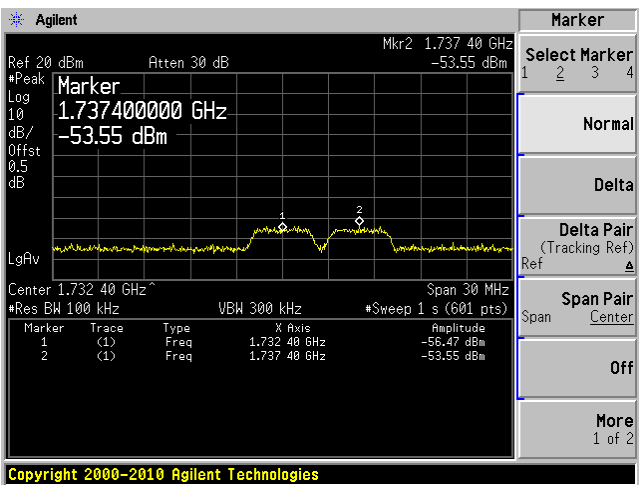
Low Channel Input



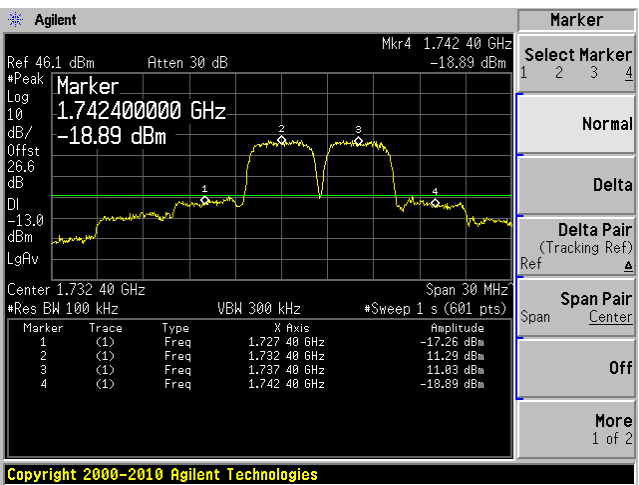
Low Channel Output



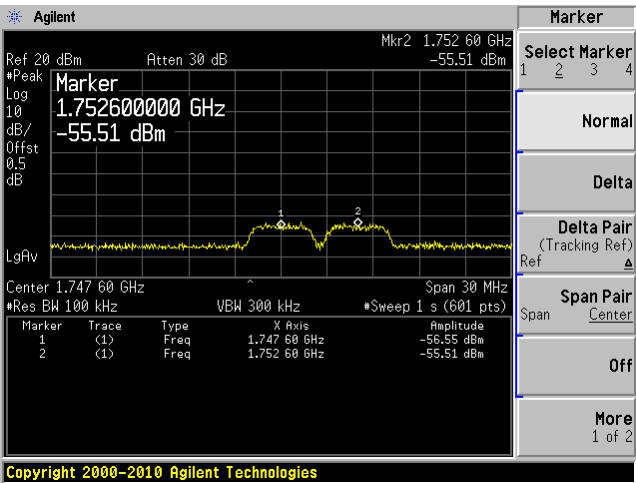
Middle Channel Input



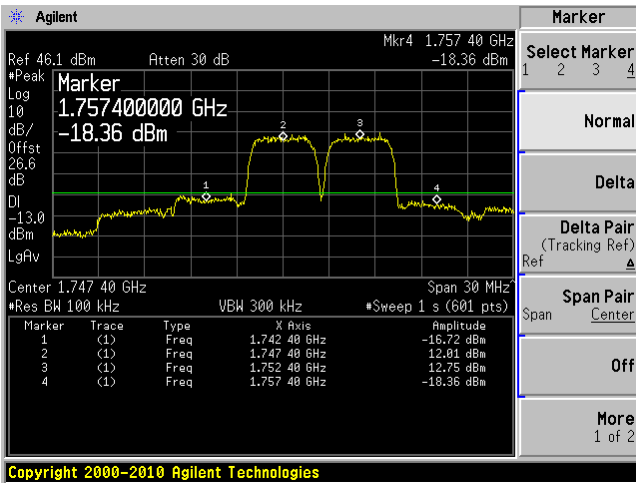
Middle Channel Output



High Channel Input

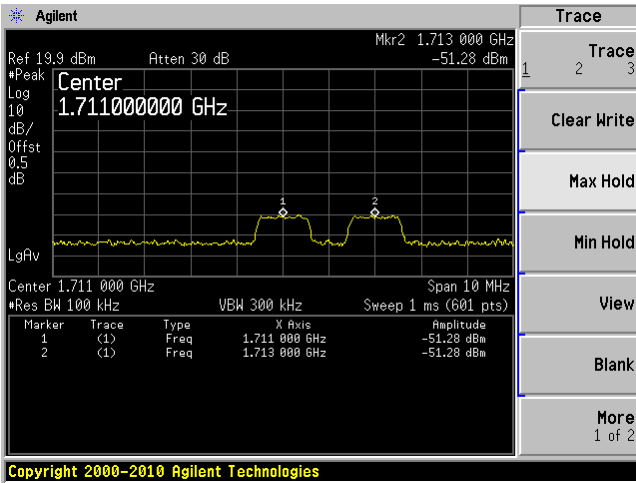


High Channel Output

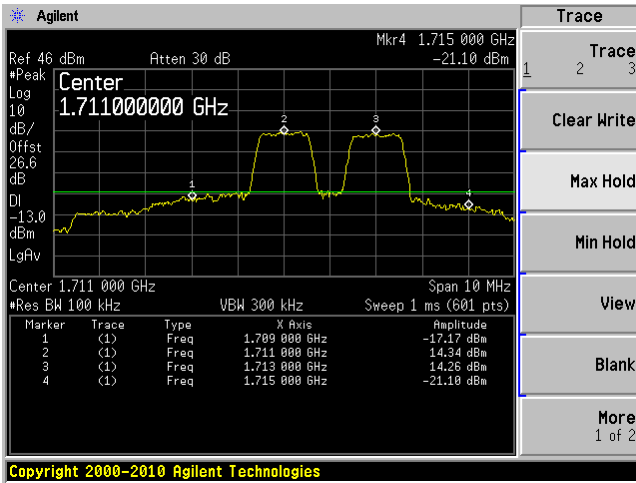


Modulation: LTE QPSK (1.4 MHz)

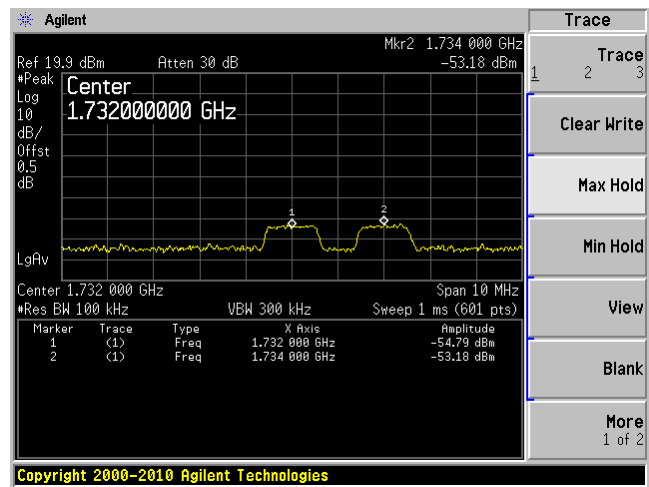
Low Channel Input



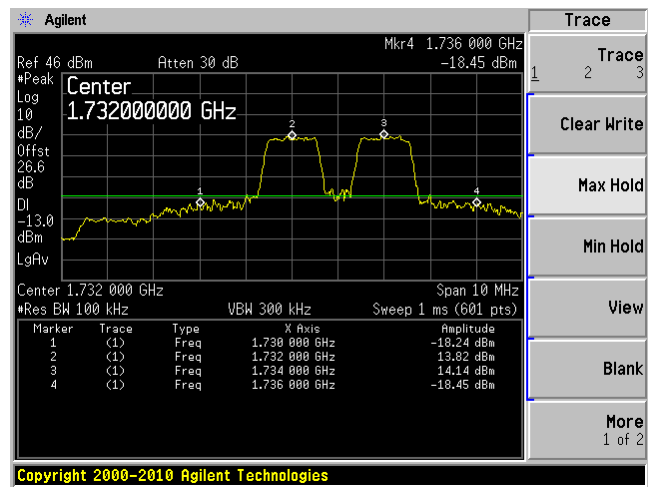
Low Channel Output



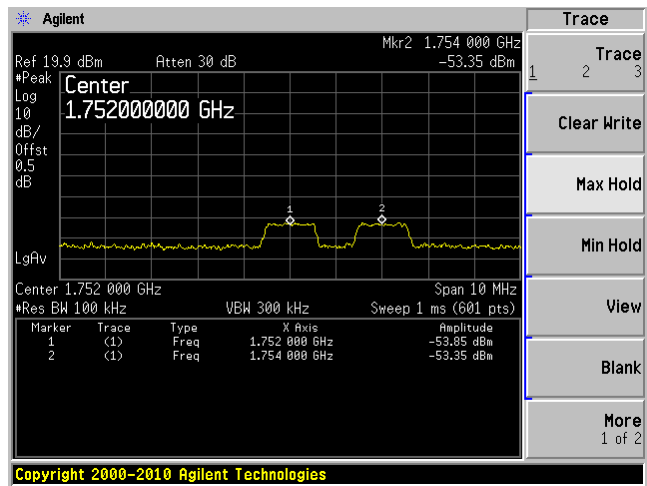
Middle Channel Input



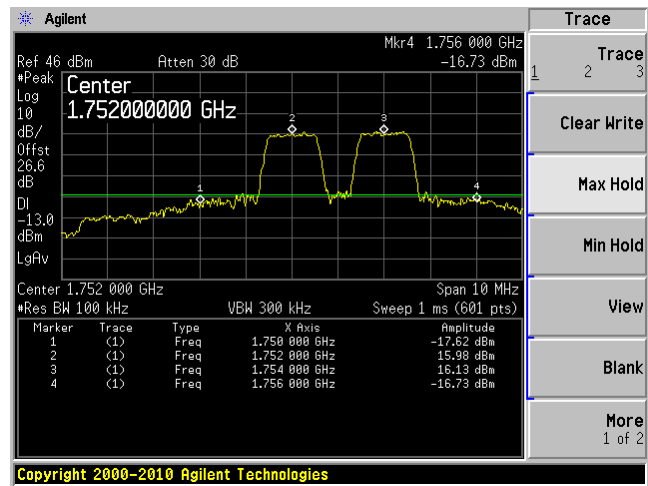
Middle Channel Output



High Channel Input

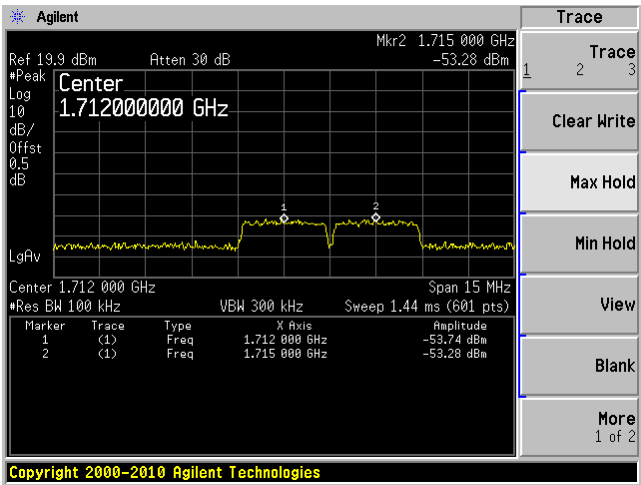


High Channel Output

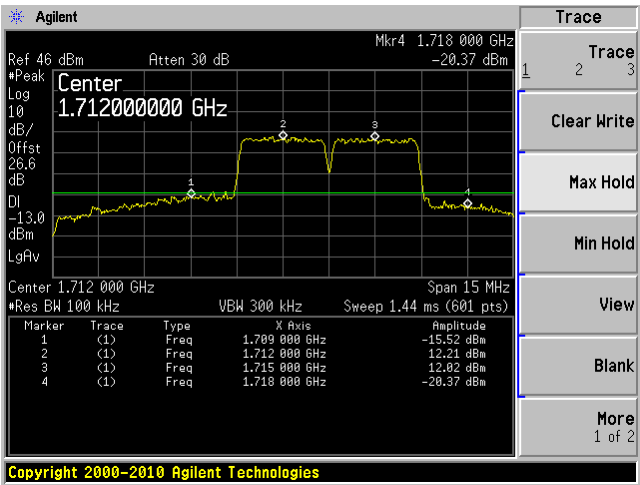


Modulation: LTE QPSK (3MHz)

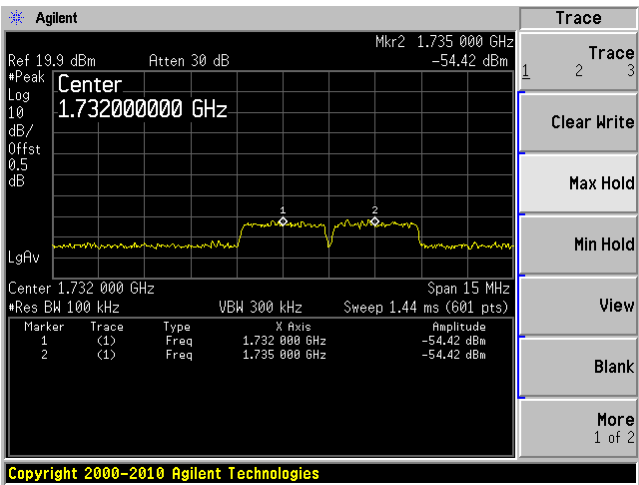
Low Channel Input



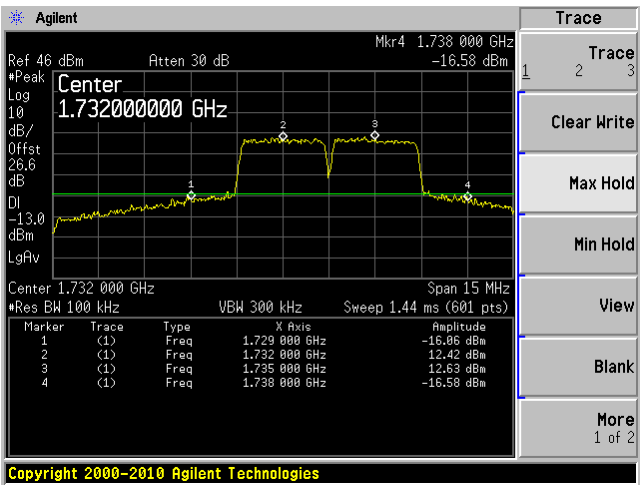
Low Channel Output



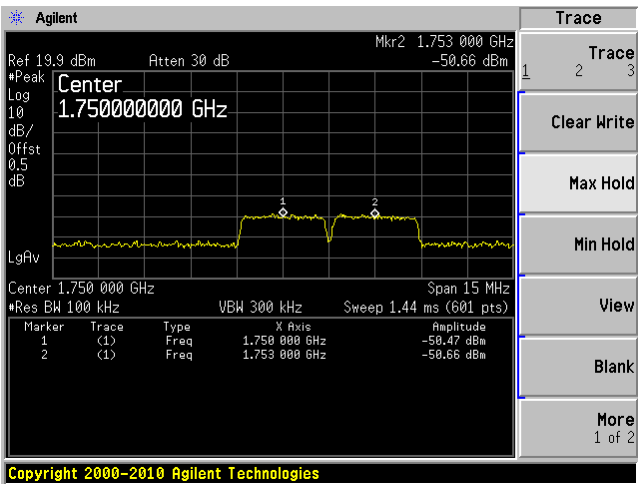
Middle Channel Input



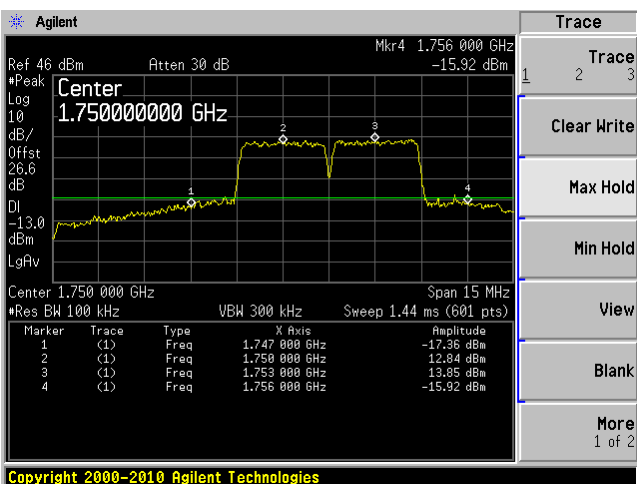
Middle Channel Output



High Channel Input

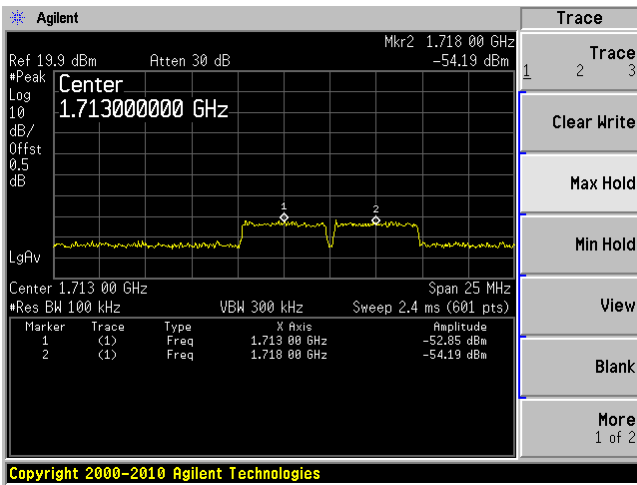


High Channel Output

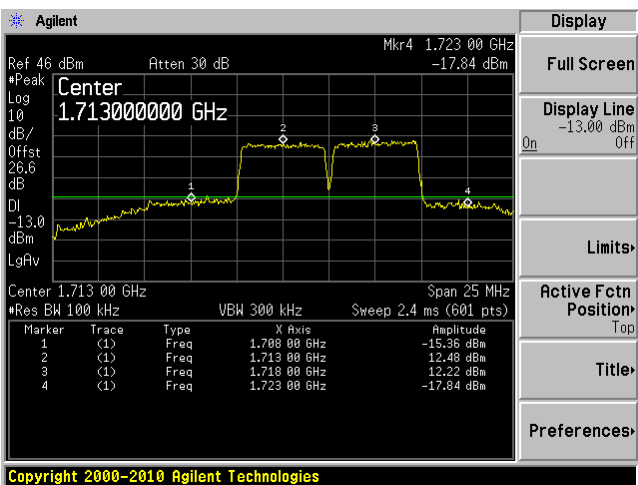


Modulation: LTE QPSK (5 MHz)

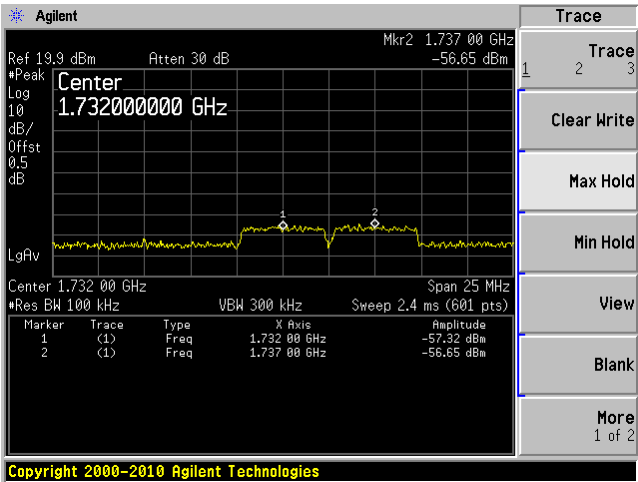
Low Channel Input



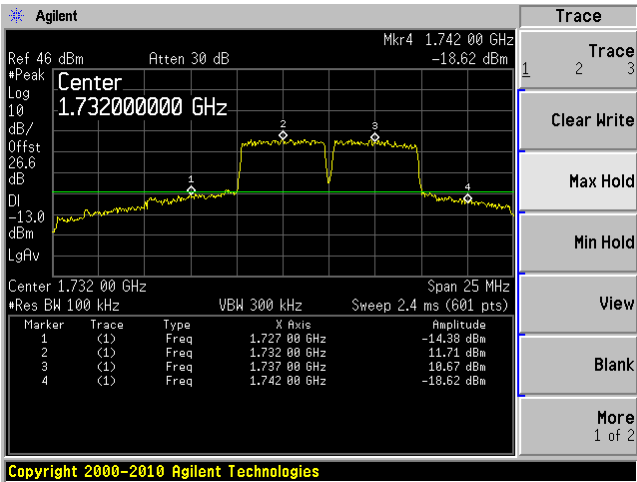
Low Channel Output



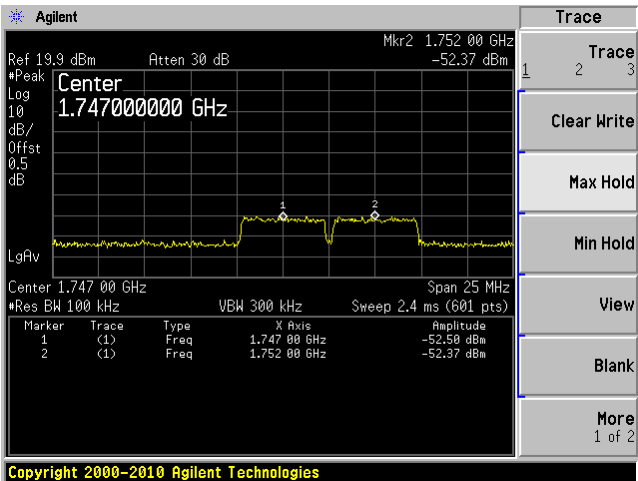
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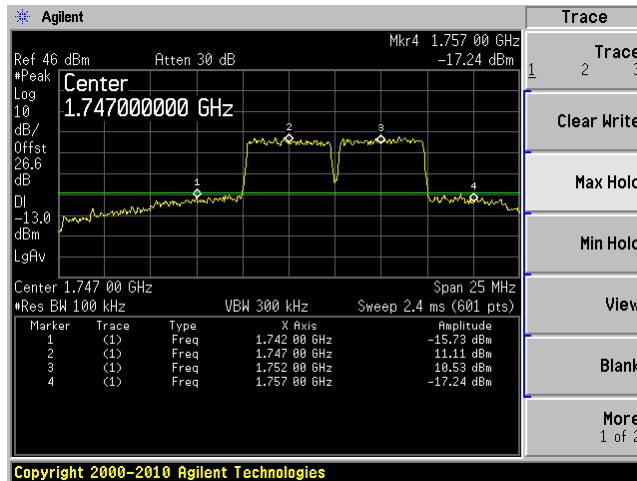
Middle Channel Output



High Channel Input

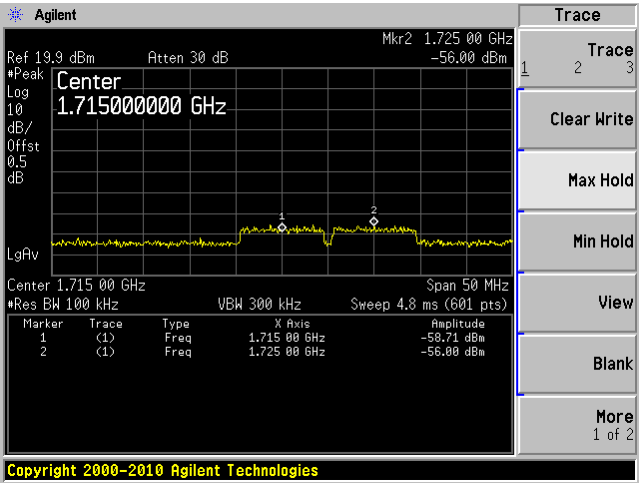


High Channel Output

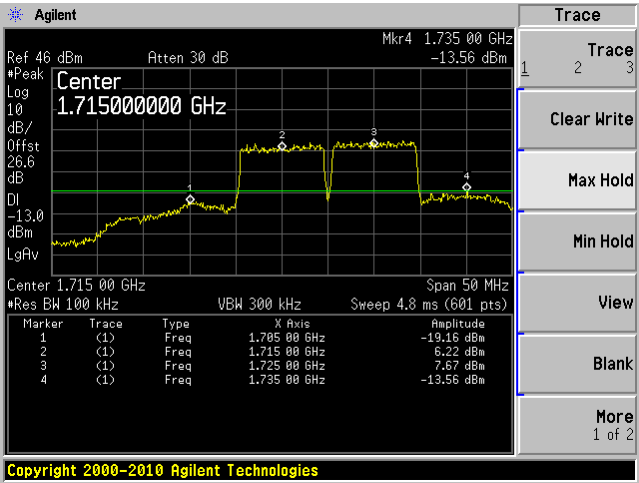


Modulation: LTE QPSK (10 MHz)

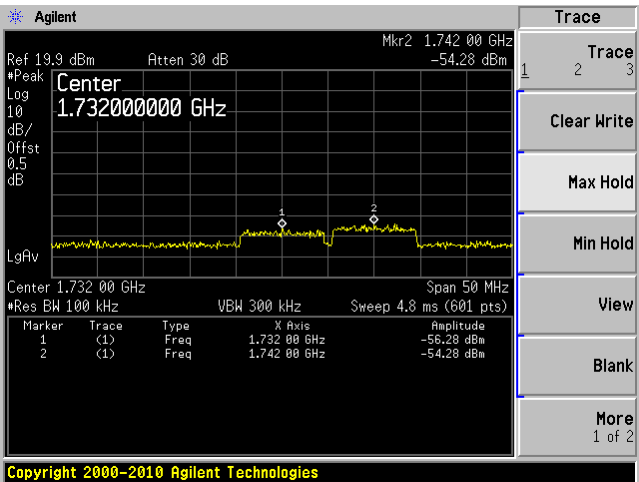
Low Channel Input



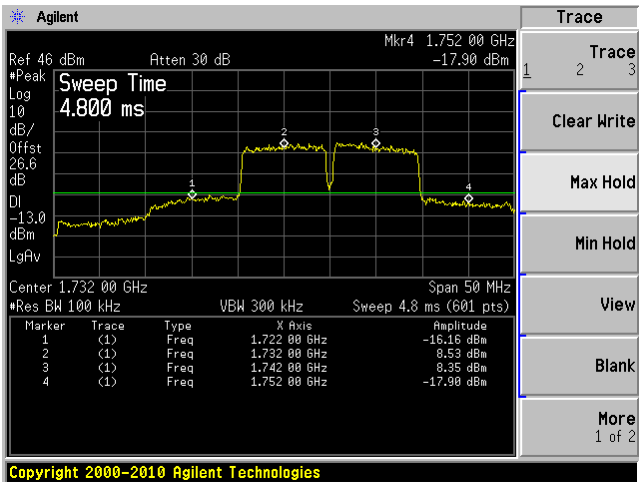
Low Channel Output



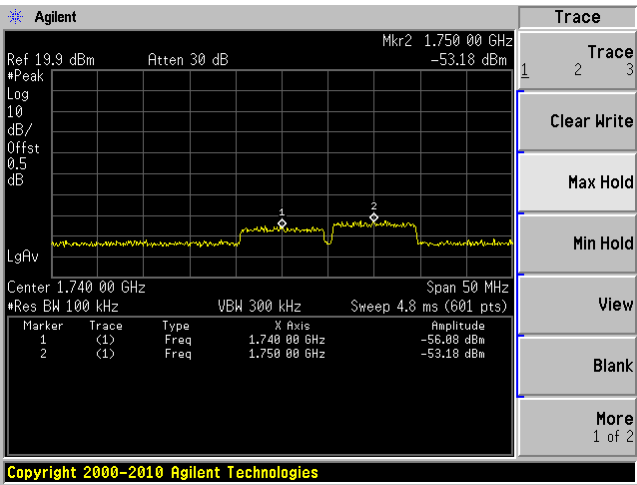
Middle Channel Input



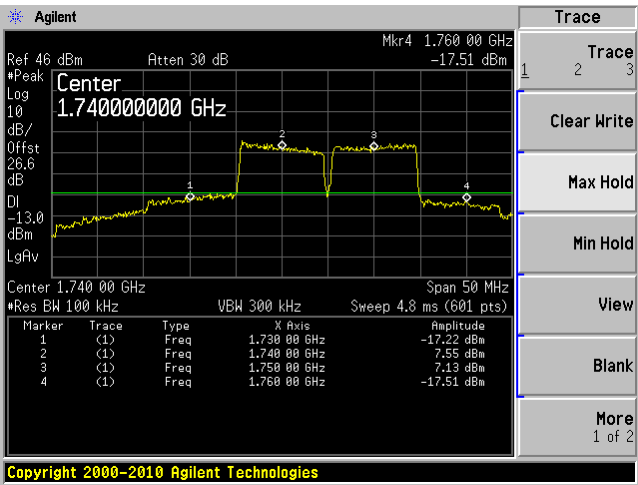
Middle Channel Output



High Channel Input

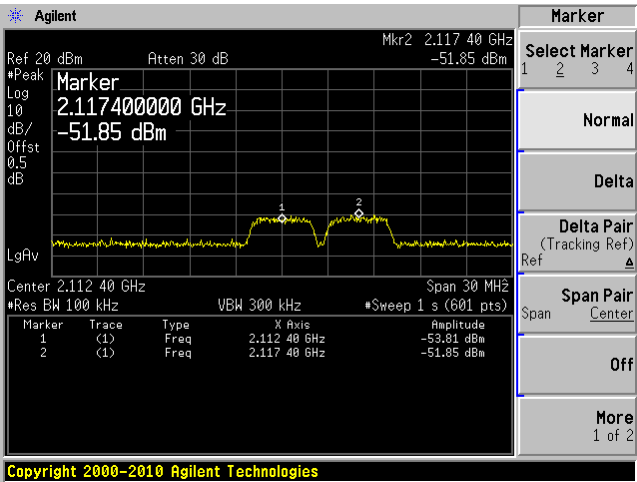


High Channel Output

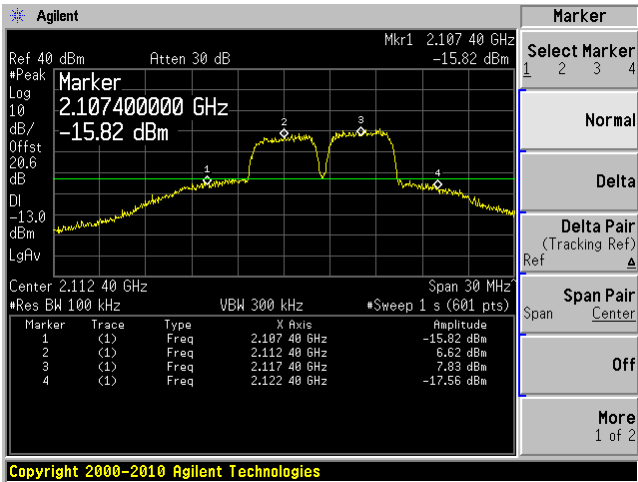


DL: 2110-2155 MHz

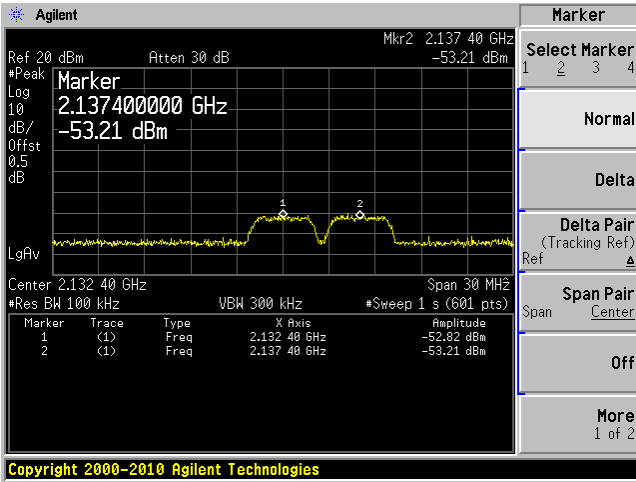
Low Channel Input



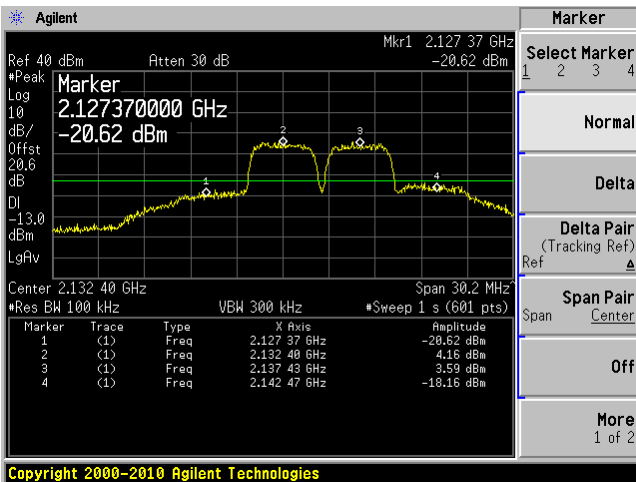
Low Channel Output



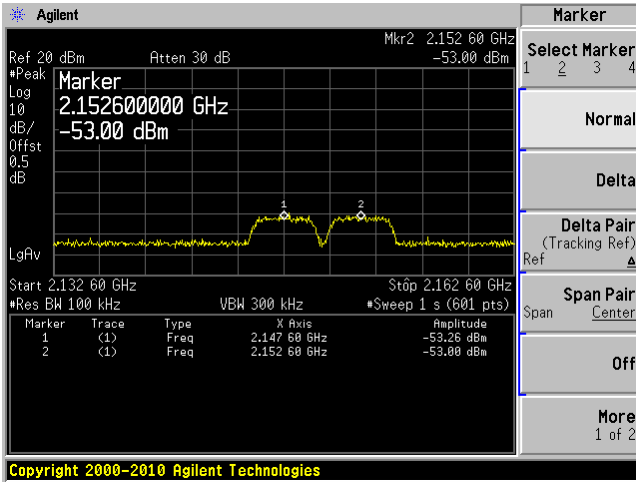
Middle Channel Input



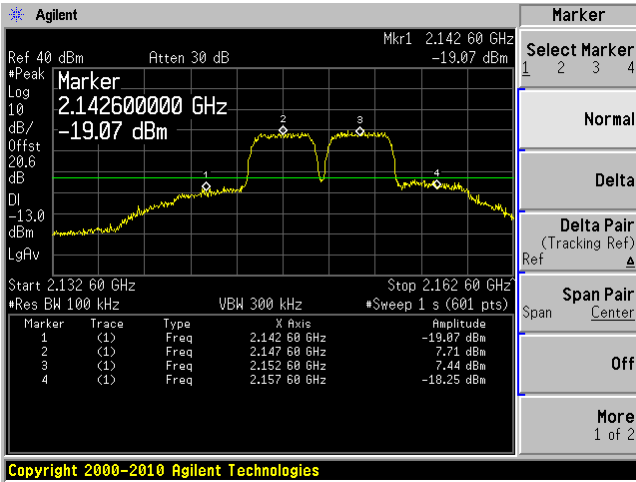
Middle Channel Output



High Channel Input

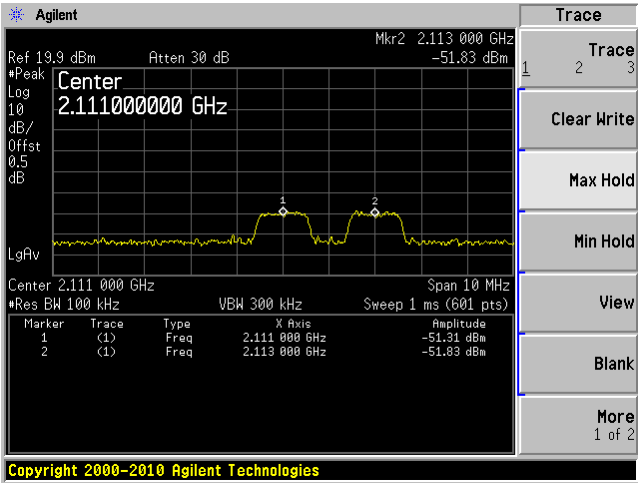


High Channel Output

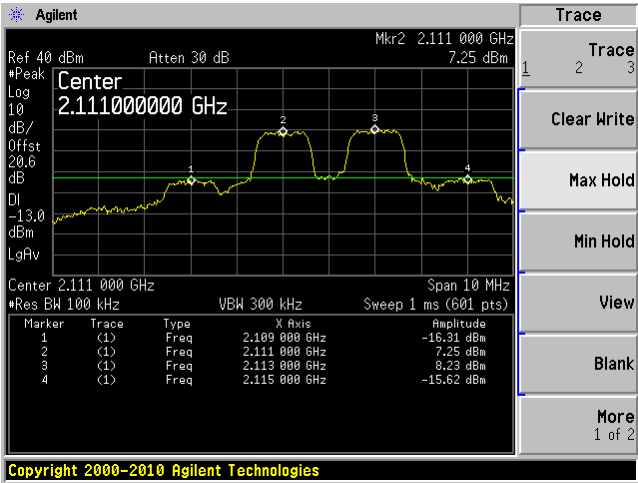


Modulation: LTE QPSK (1.4 MHz)

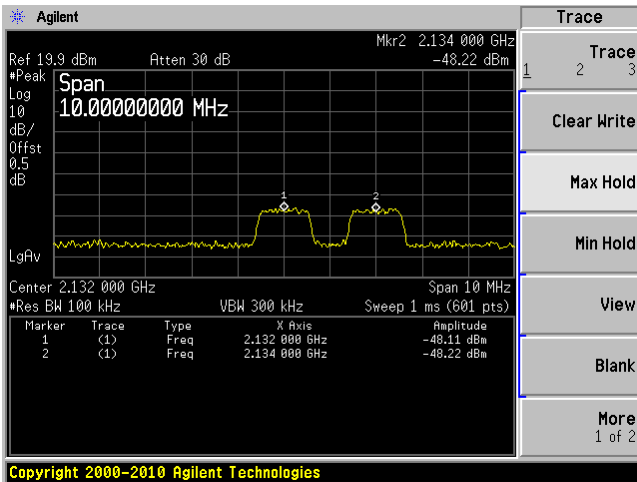
Low Channel Input



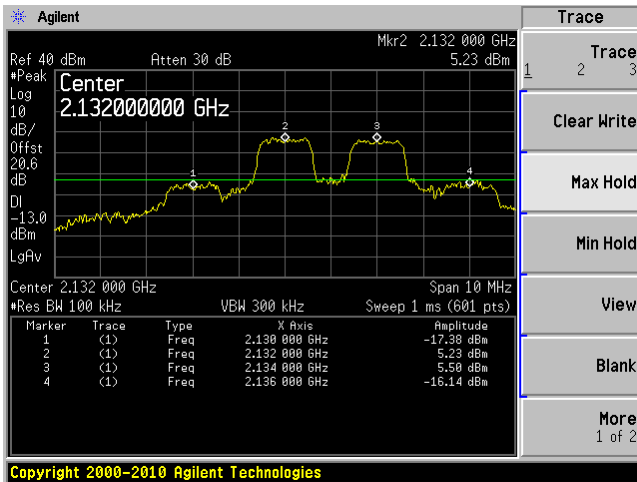
Low Channel Output



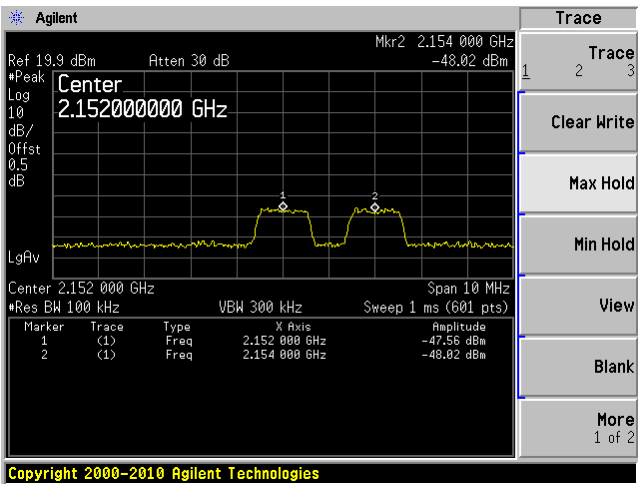
Middle Channel Input



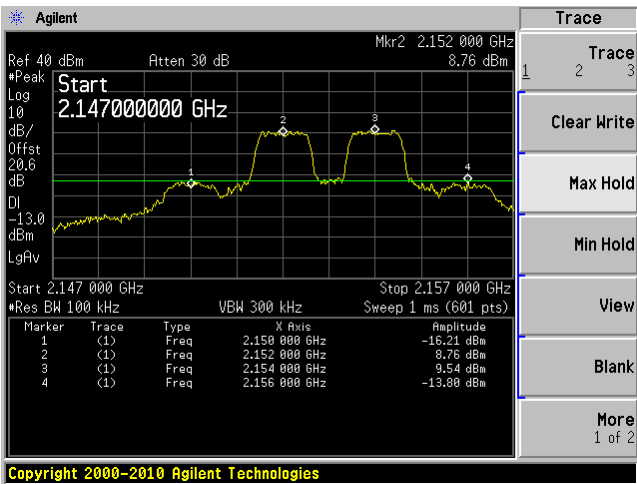
Middle Channel Output



High Channel Input

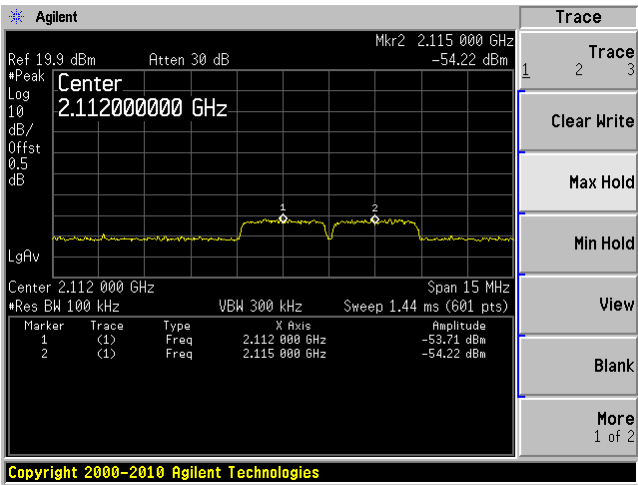


High Channel Output

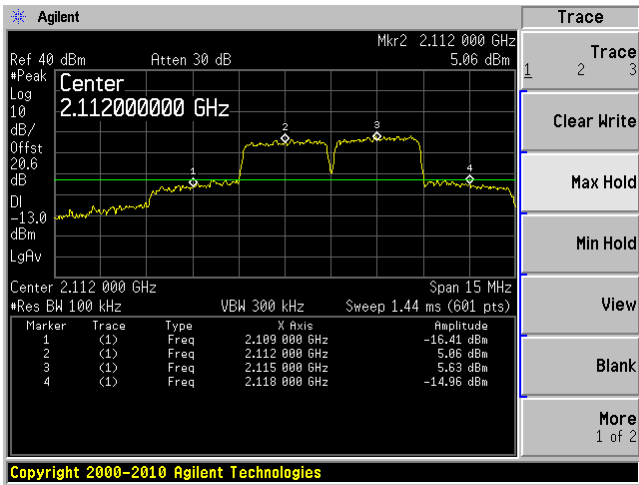


Modulation: LTE QPSK (3MHz)

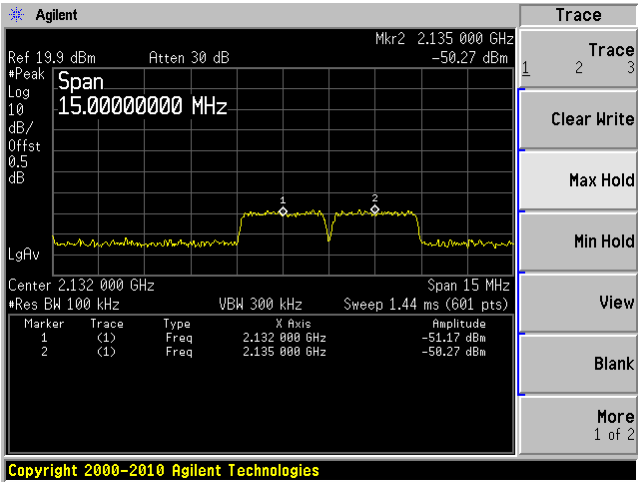
Low Channel Input



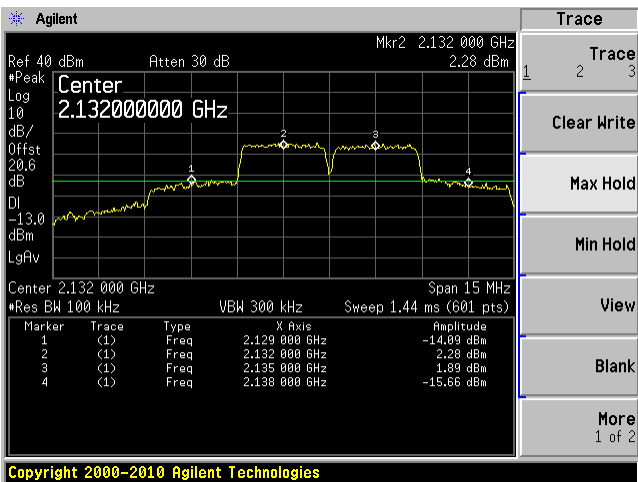
Low Channel Output



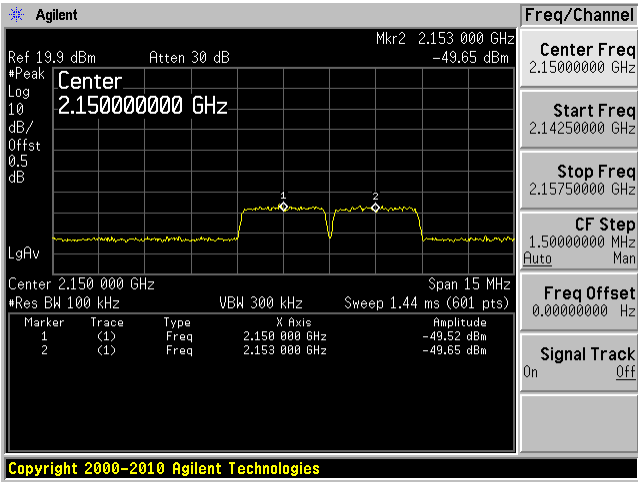
Middle Channel Input



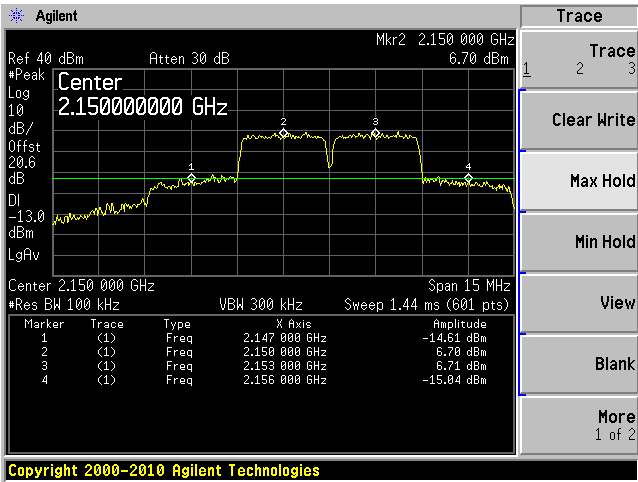
Middle Channel Output



High Channel Input

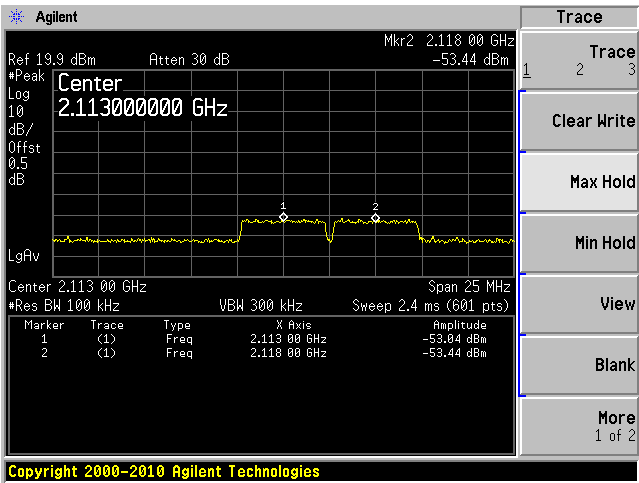


High Channel Output

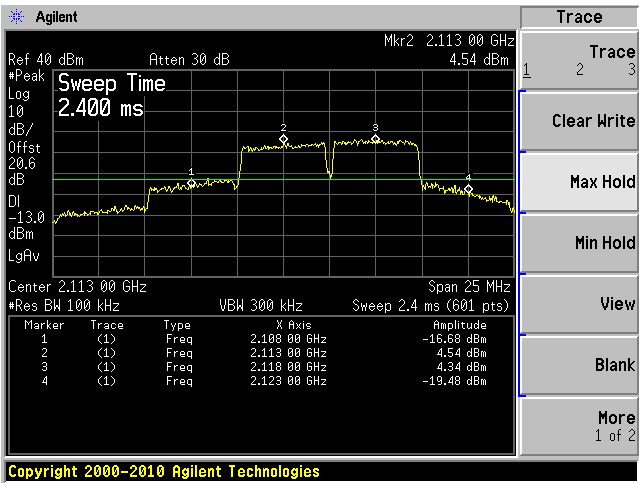


Modulation: LTE QPSK (5 MHz)

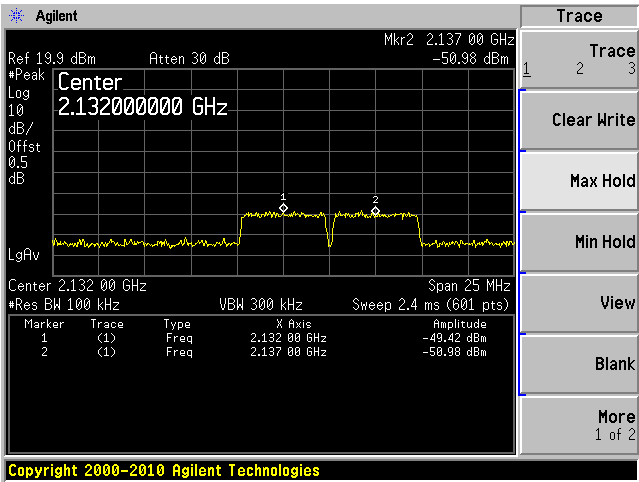
Low Channel Input



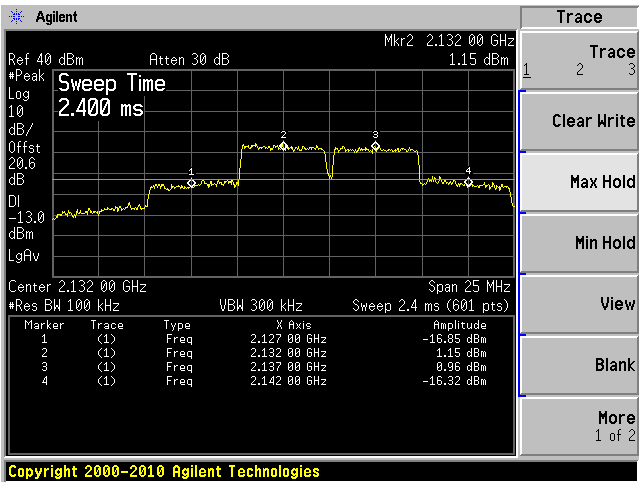
Low Channel Output



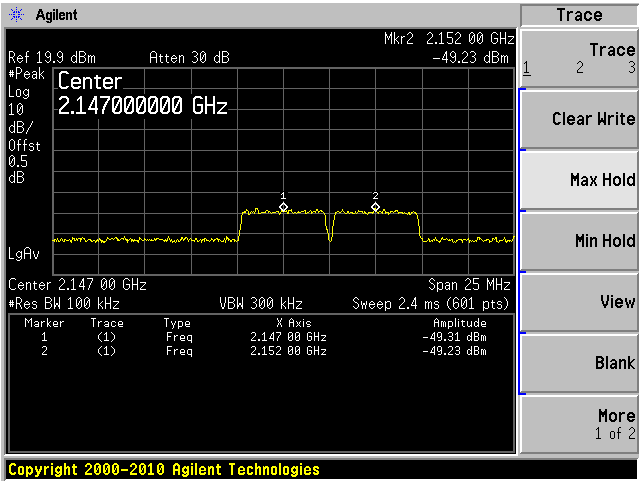
Middle Channel Input



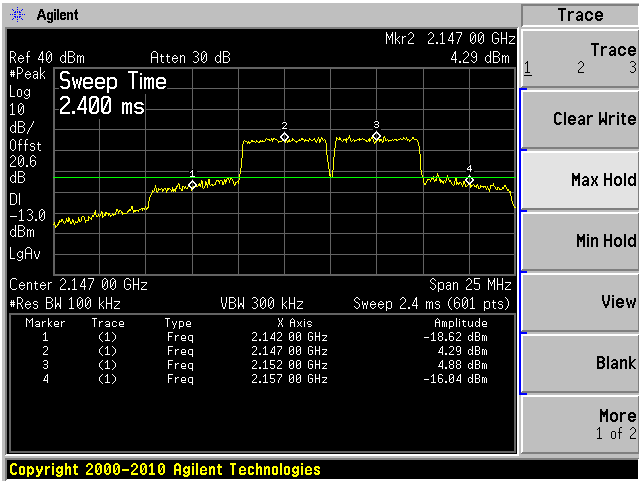
Middle Channel Output



High Channel Input

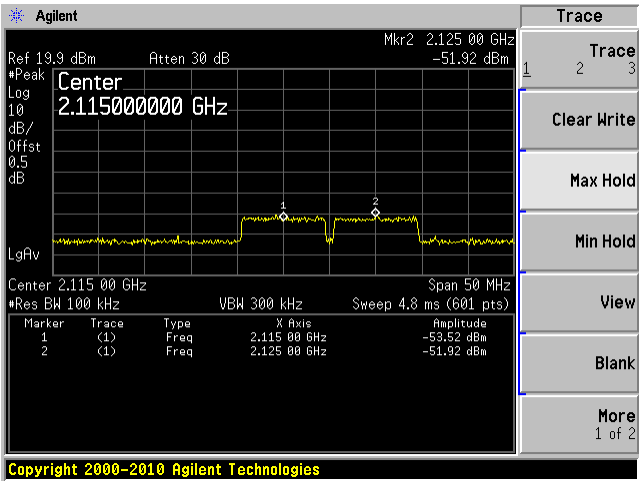


High Channel Output

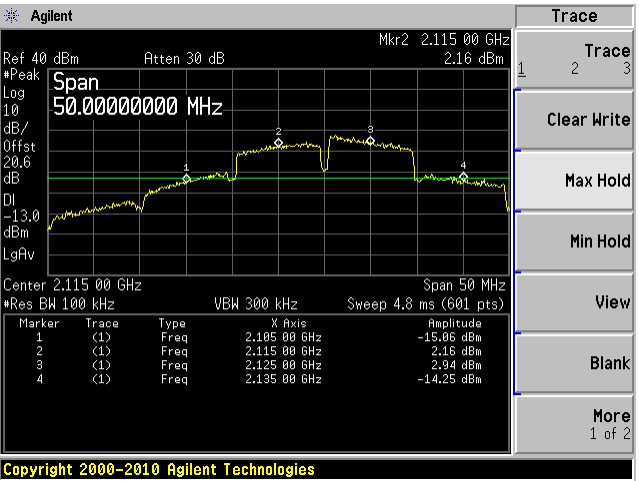


Modulation: LTE QPSK (10 MHz)

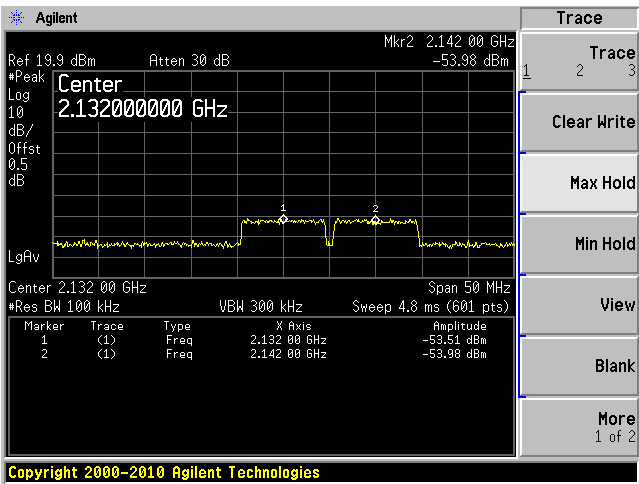
Low Channel Input



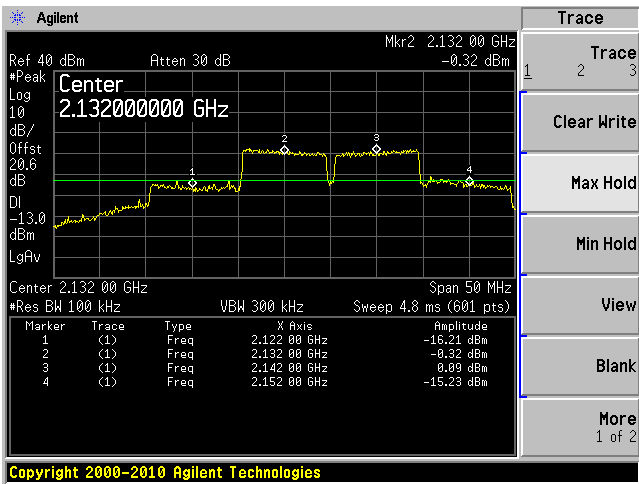
Low Channel Output



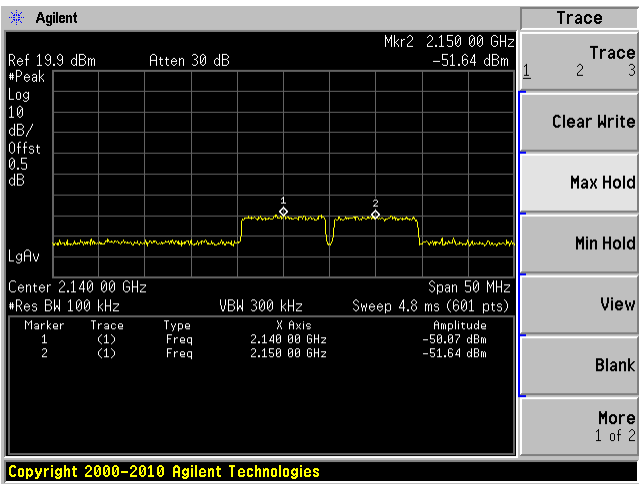
Middle Channel Input



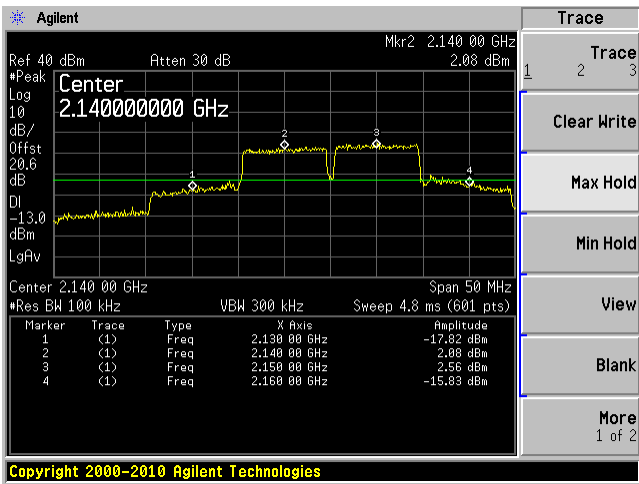
Middle Channel Output



High Channel Input



High Channel Output

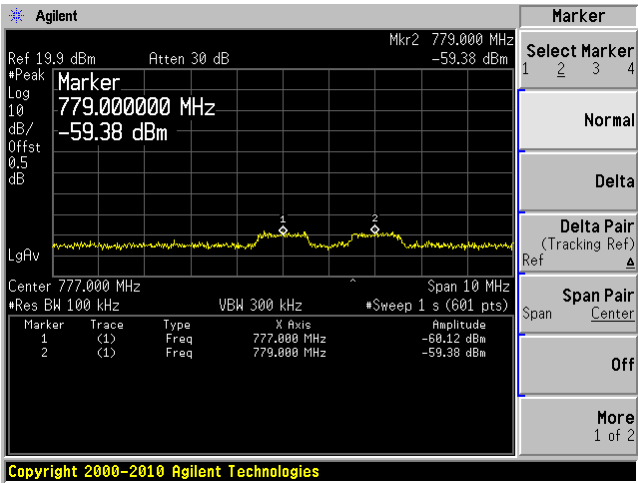


LTE Band (Band 13)

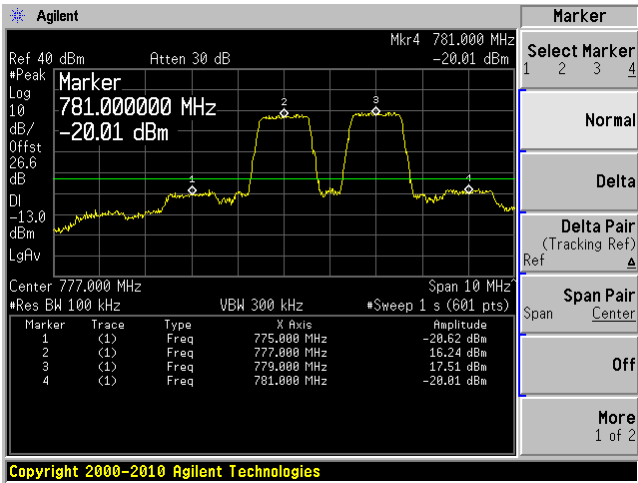
UL: 776-787 MHz

Modulation: QPSK (1.4 MHz)

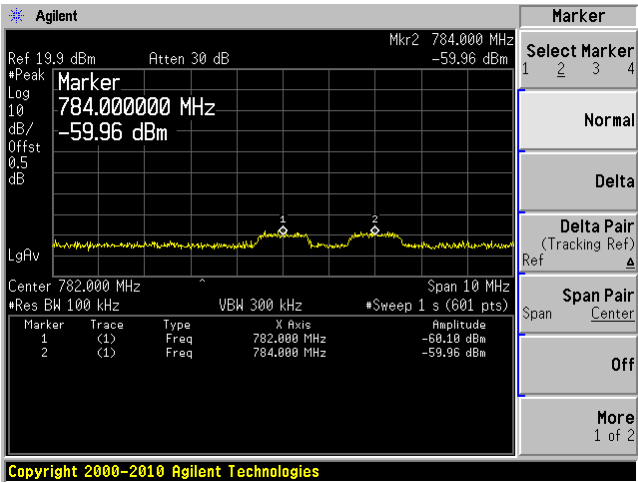
Low Channel Input



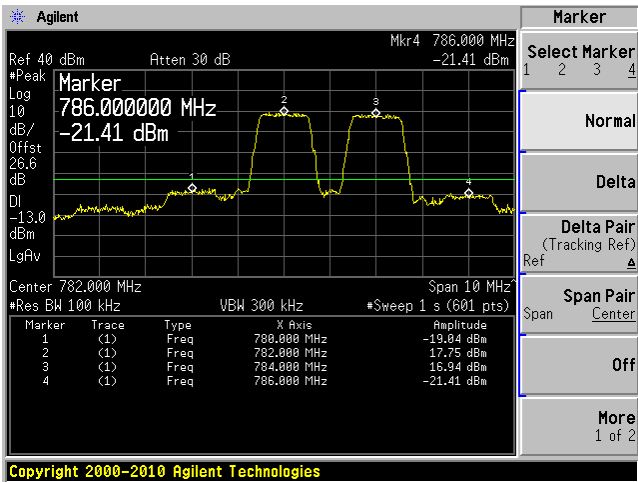
Low Channel Output



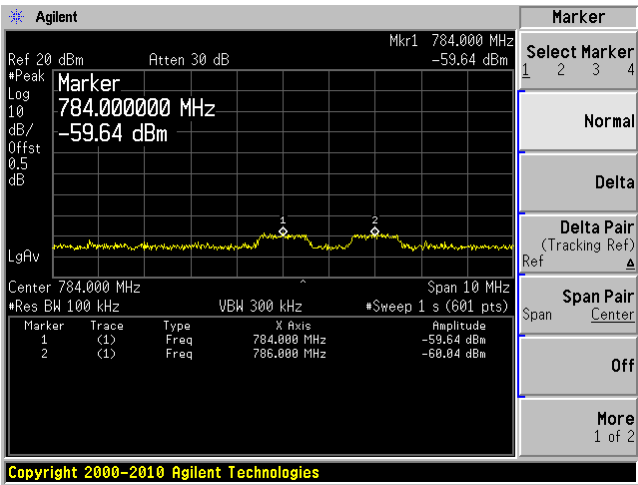
Middle Channel Input



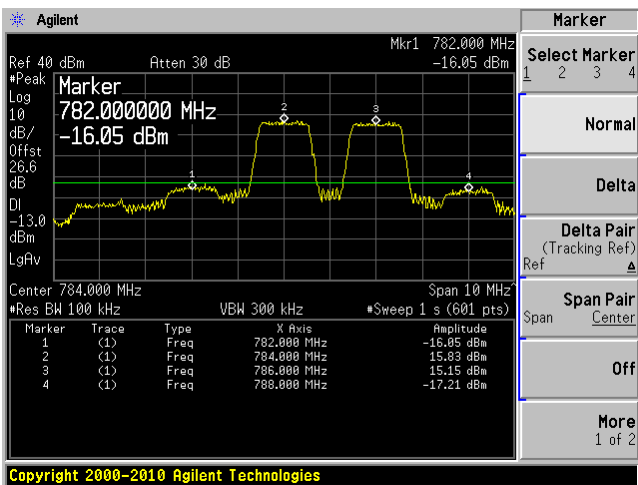
Middle Channel Output



High Channel Input

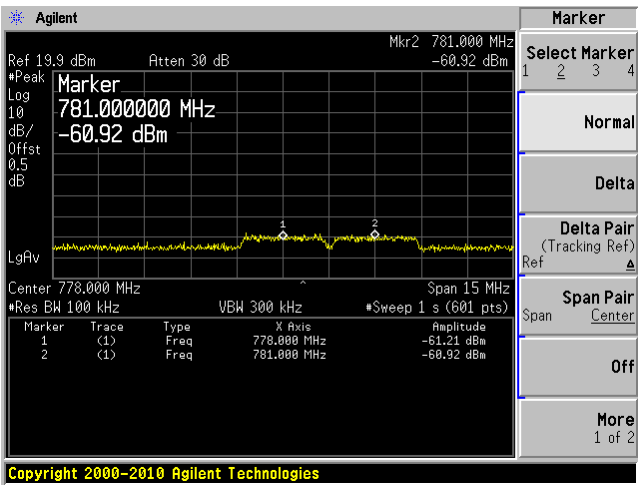


High Channel Output

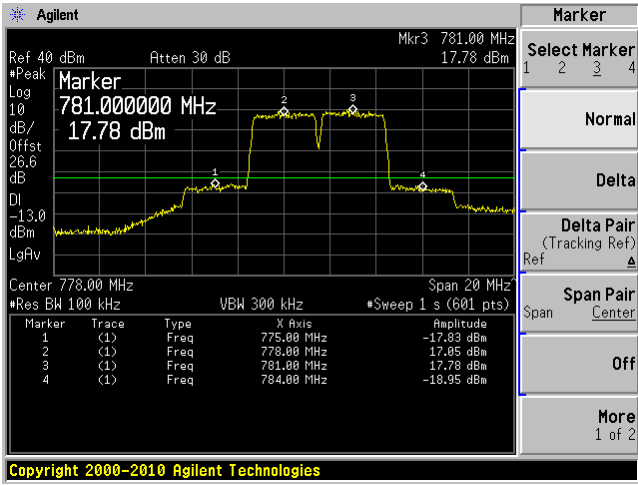


Modulation: QPSK (3 MHz)

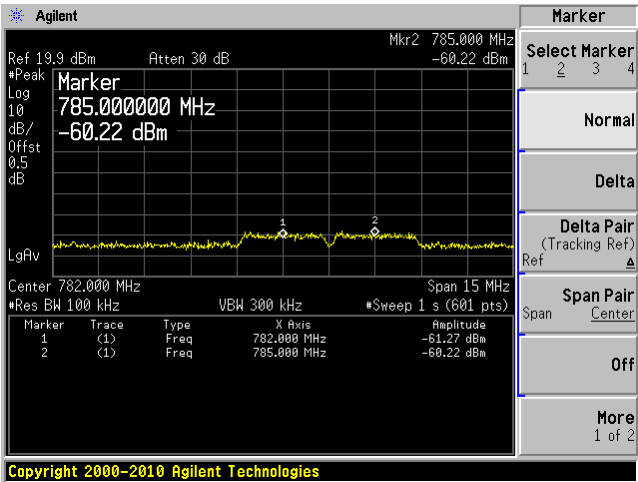
Low Channel Input



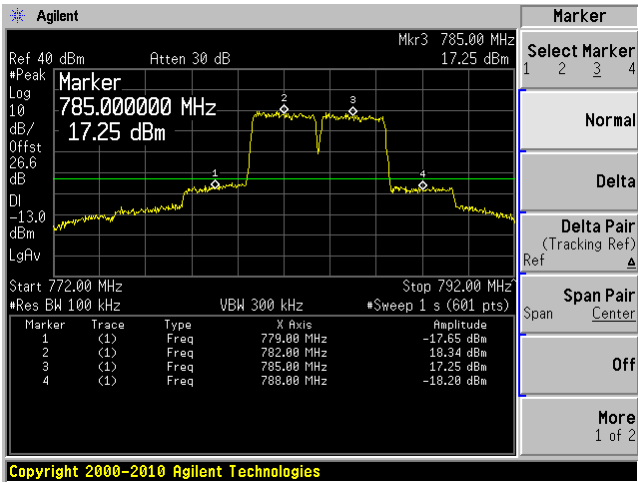
Low Channel Output



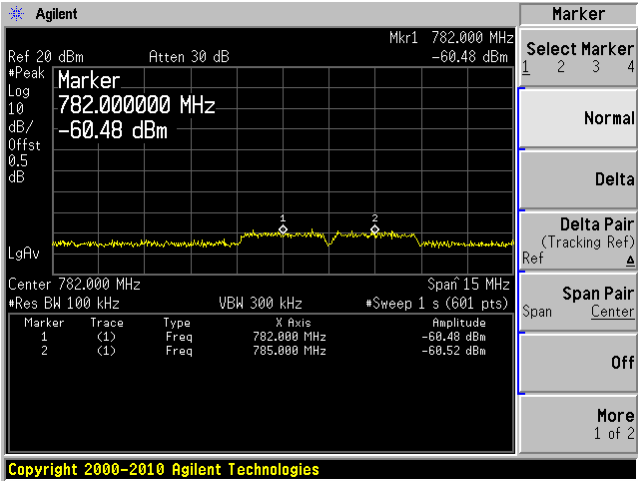
Middle Channel Input



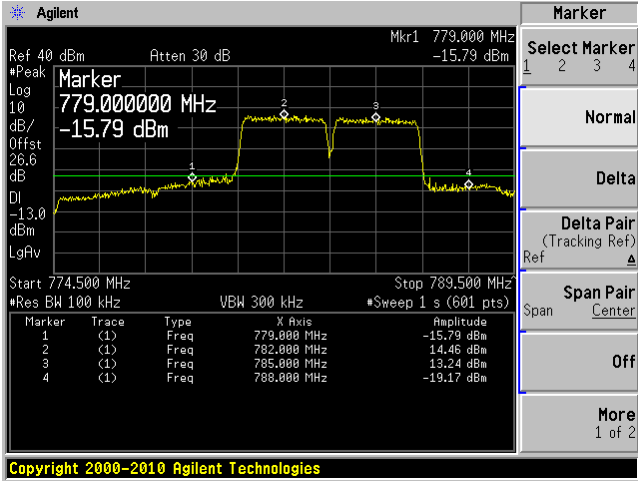
Middle Channel Output



High Channel Input



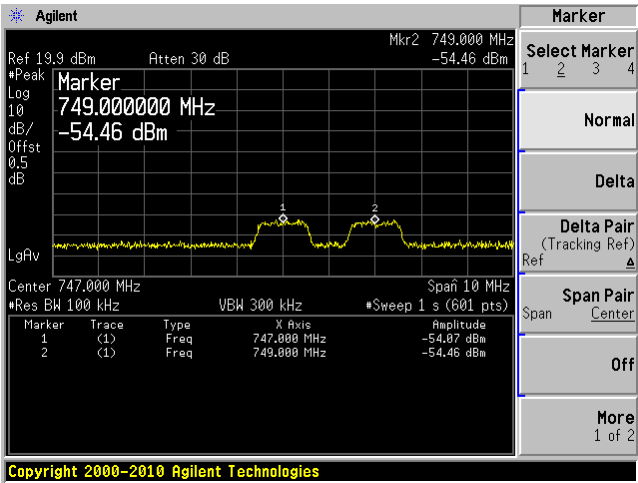
High Channel Output



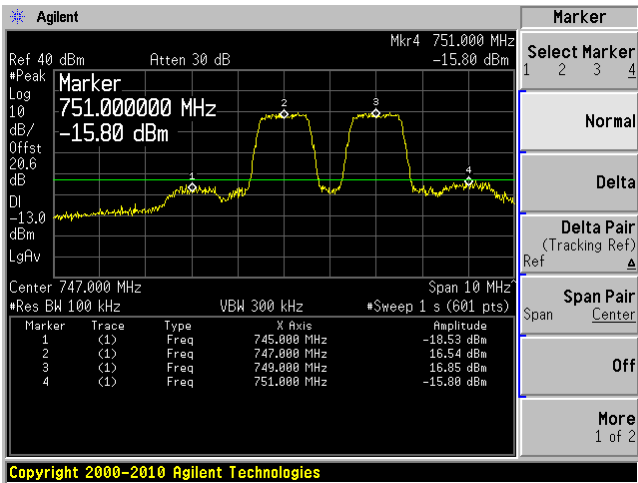
DL: 746-757 MHz

Modulation: QPSK (1.4 MHz)

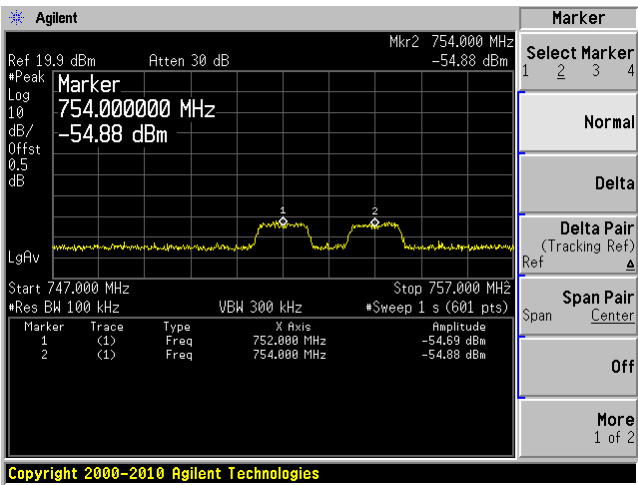
Low Channel Input



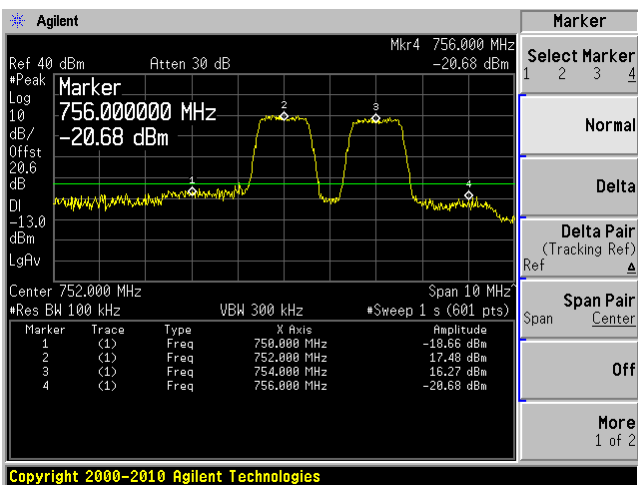
Low Channel Output



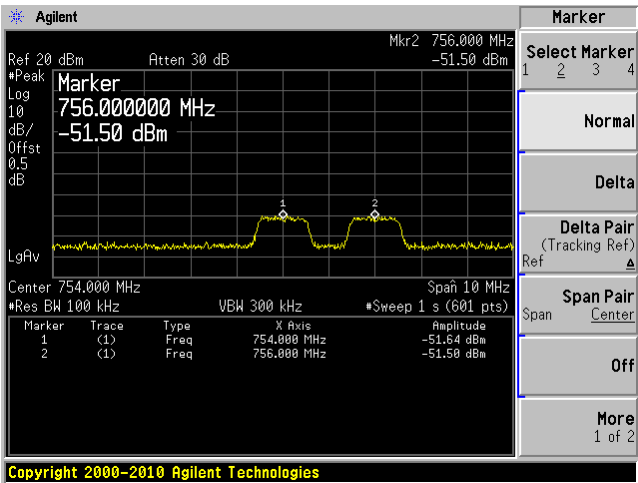
Middle Channel Input



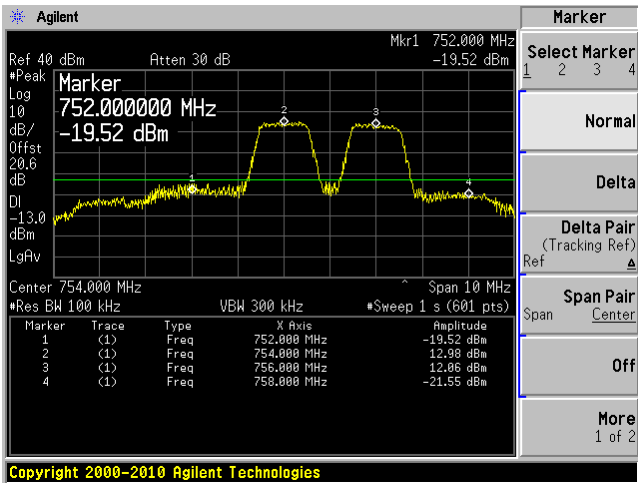
Middle Channel Output



High Channel Input

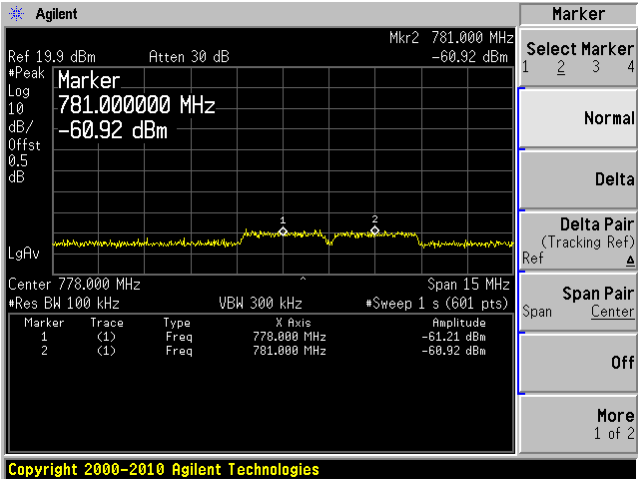


High Channel Output

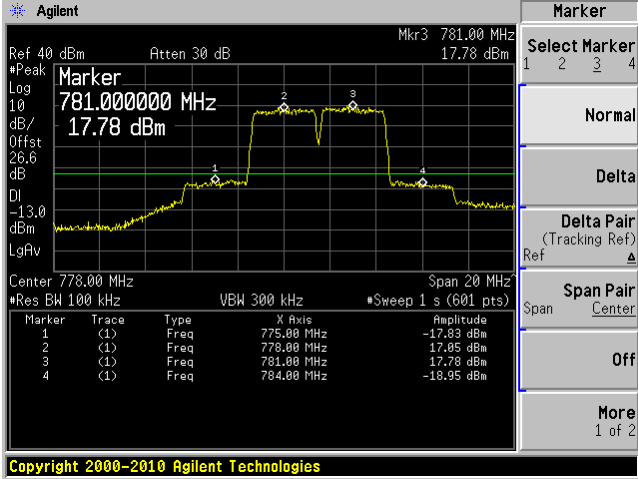


Modulation: QPSK (3 MHz)

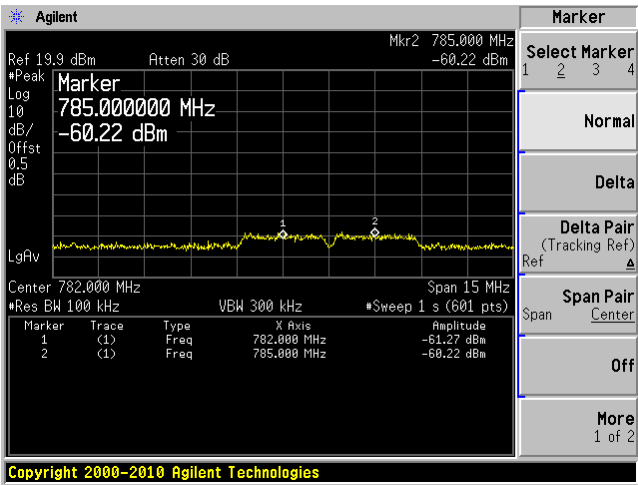
Low Channel Input



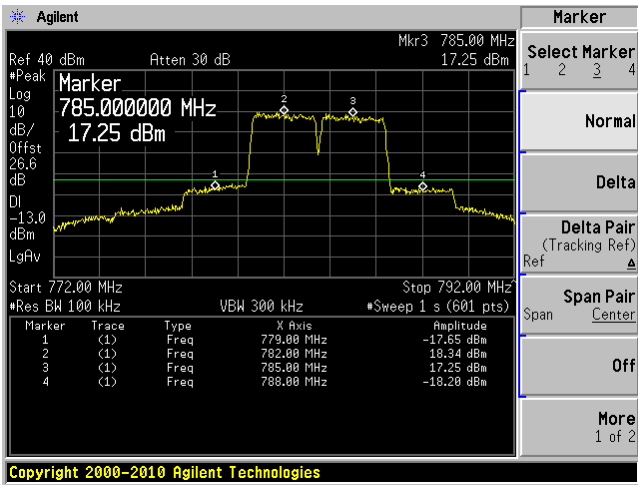
Low Channel Output



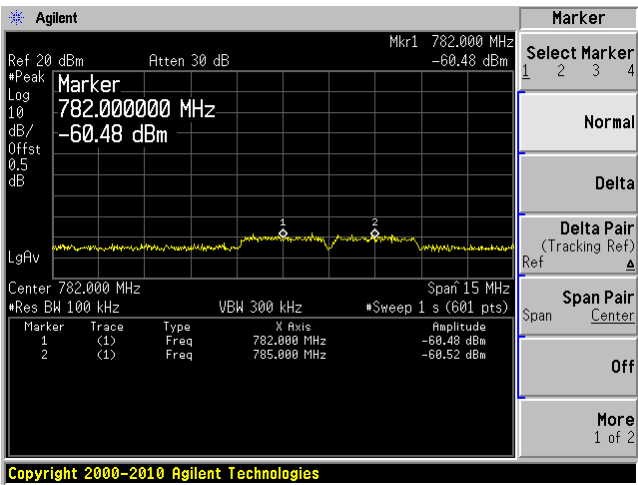
Middle Channel Input



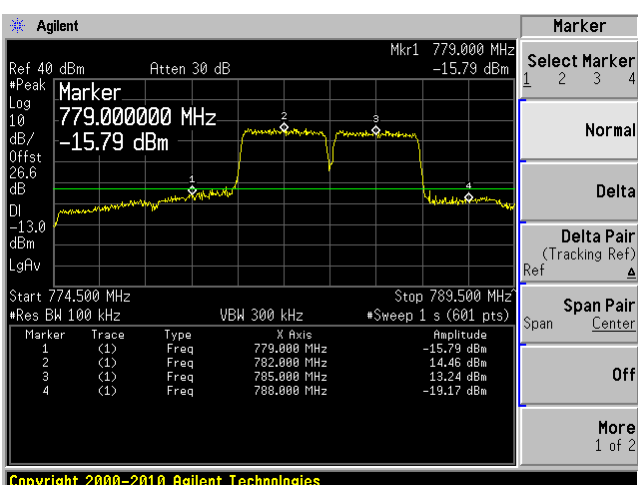
Middle Channel Output



High Channel Input



High Channel Output



8 FCC §27.53 – BAND EDGE

8.1 Applicable Standard

According to FCC §27.53, the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

8.2 Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

The center of the spectrum analyzer was set to block edge frequency.

8.3 Test Equipment List and Details

Manufacturers	Descriptions	Models	Serial Numbers	Calibration Dates
Agilent	Spectrum Analyzer	E4440A	MY44303352	2012-05-10
Agilent	Signal Generator	E4438C	MY45091309	2012-05-03

Statement of Traceability: BACL Corp. attests that all calibrations have been performed according to A2LA requirements, traceable to the NIST.

8.4 Test Environmental Conditions

Temperature:	23°C
Relative Humidity:	49 %
ATM Pressure:	101.2 kPa

The testing was performed by Jeffrey Wu on 2012-06-05 at RF Site.

8.5 Test Results

Please refer to the following plots.

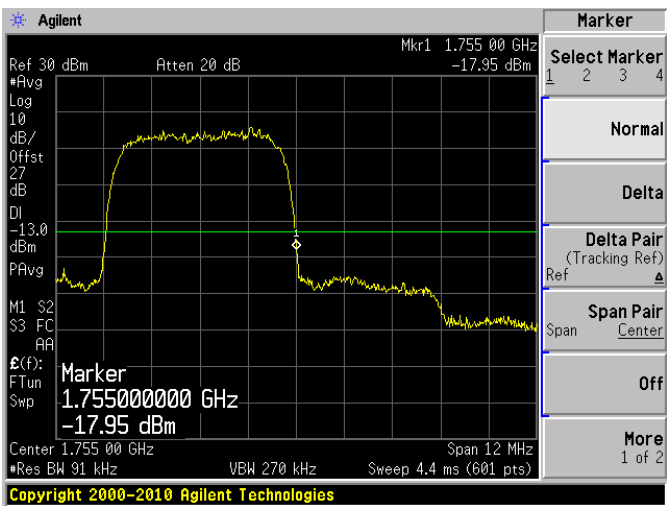
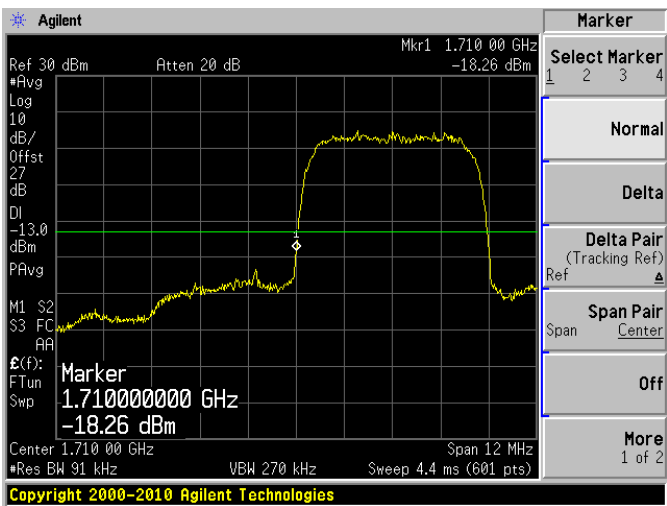
AWS Band (Band 4)

UL: 1710-1755 MHz

WCDMA/HSPA

Lowest Edge

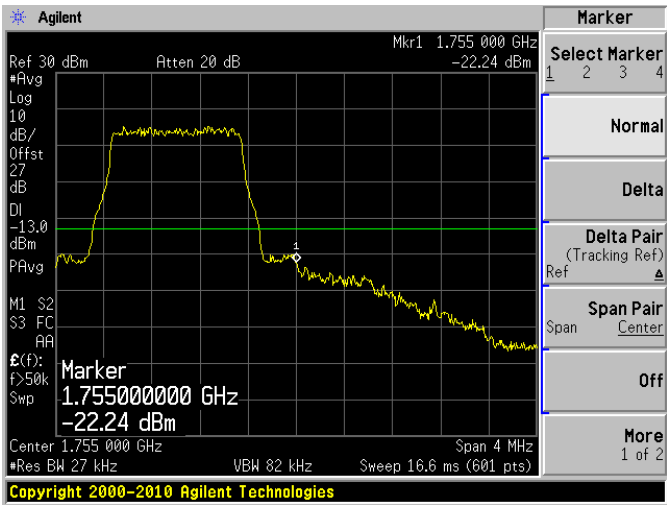
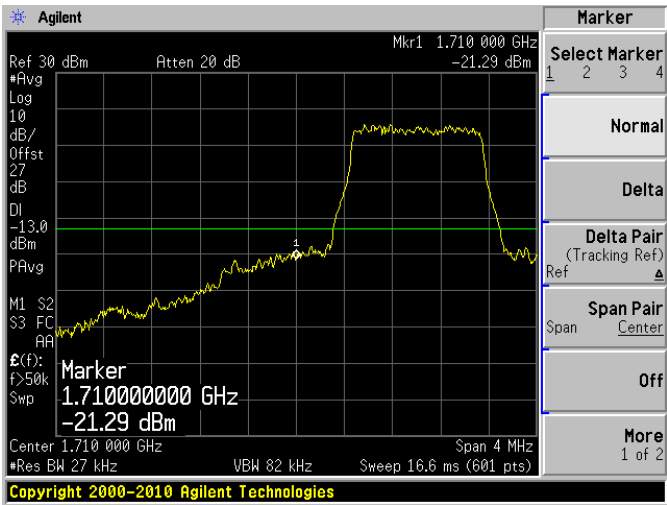
Highest Edge



Modulation: QPSK (1.4 MHz)

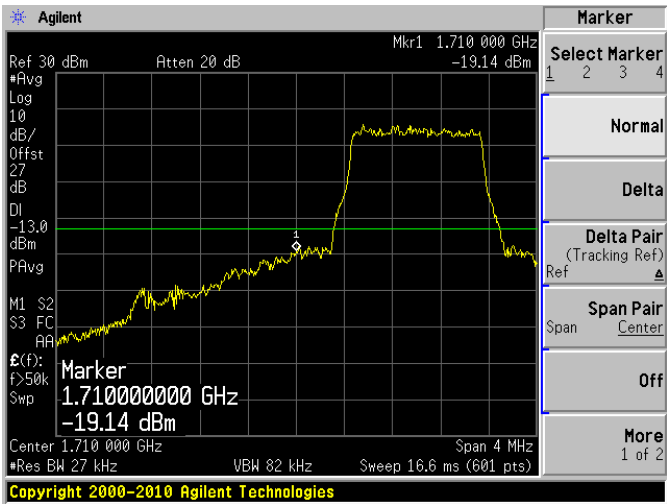
Lowest Edge

Highest Edge

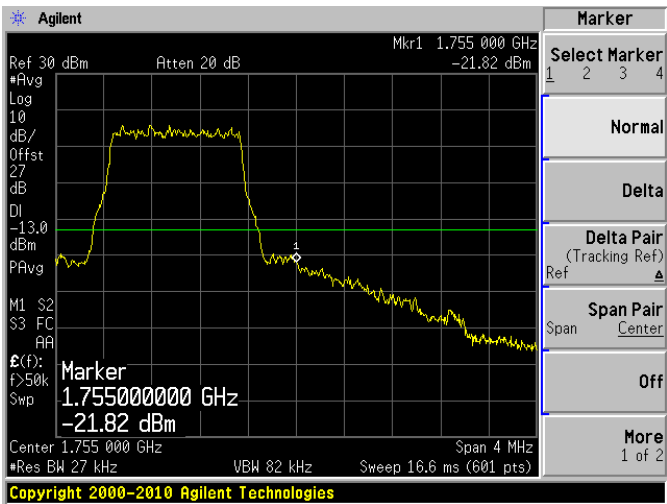


Modulation: 16QAM (1.4 MHz)

Lowest Edge

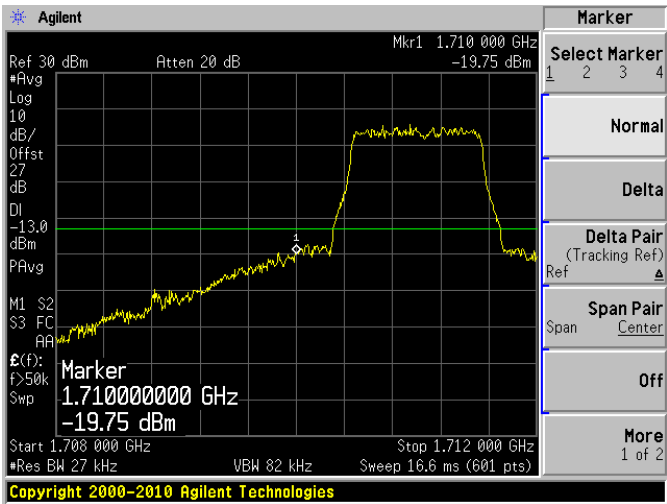


Highest Edge

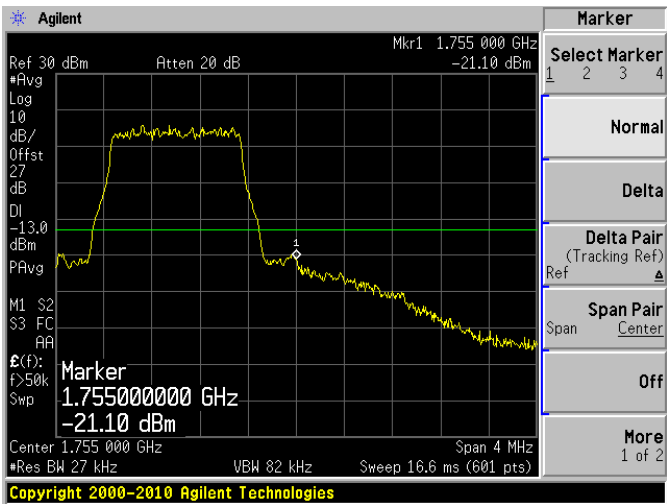


Modulation: 64QAM (1.4 MHz)

Lowest Edge



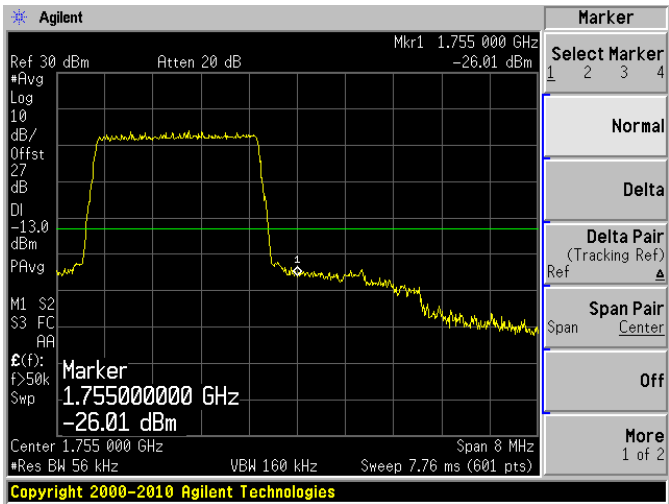
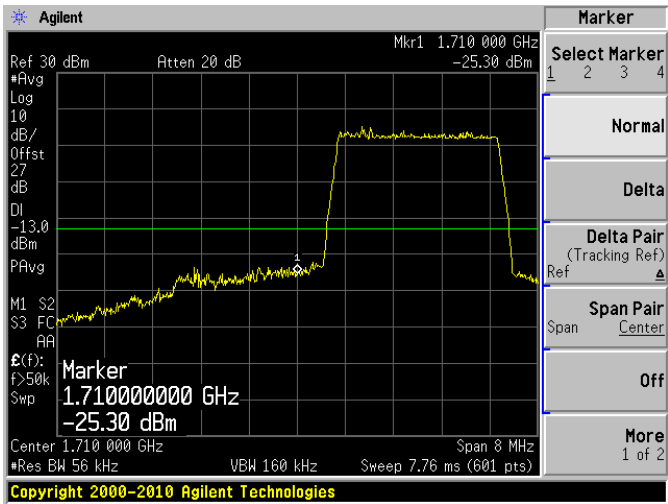
Highest Edge



Modulation: QPSK (3 MHz)

Lowest Edge

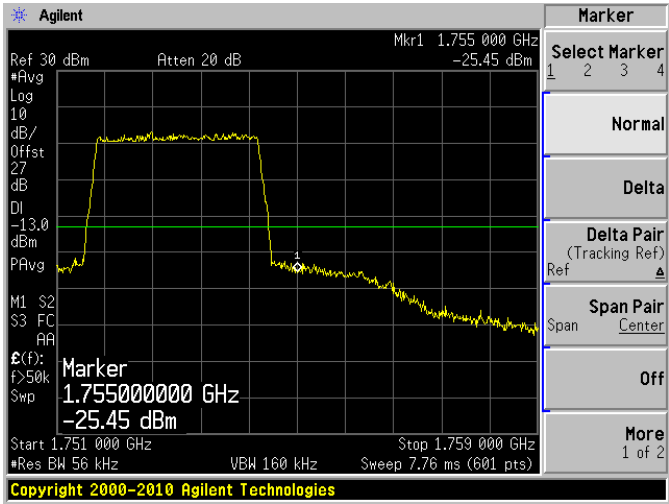
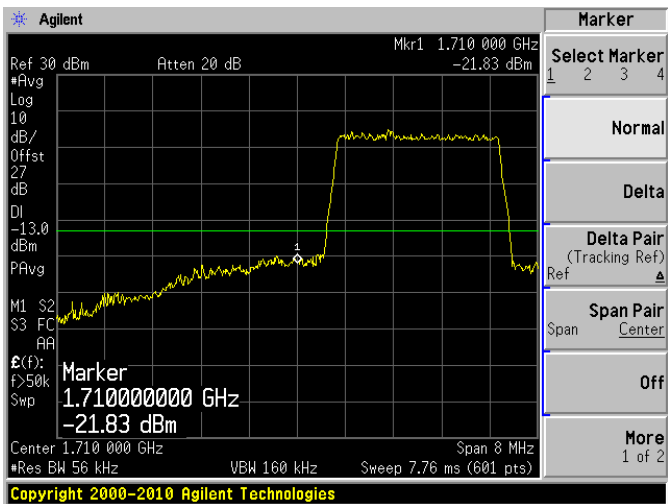
Highest Edge



Modulation: 16QAM (3 MHz)

Lowest Edge

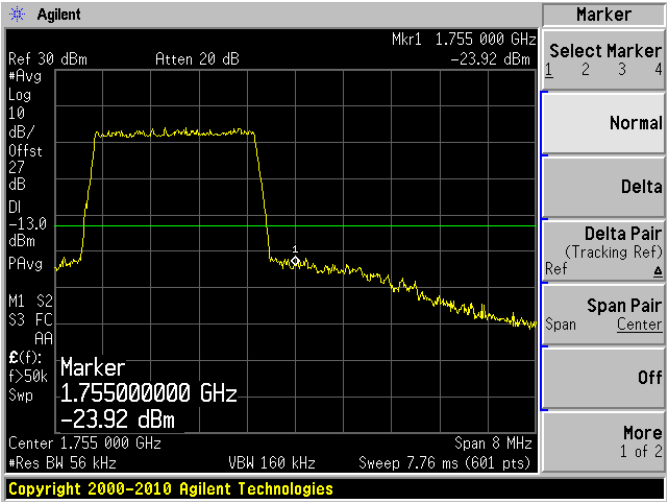
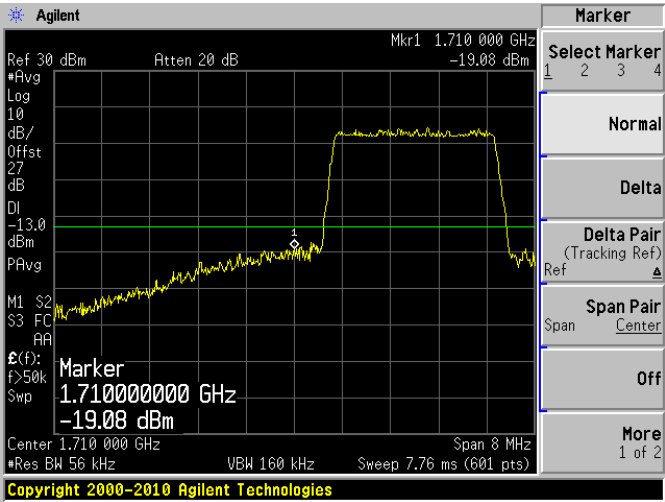
Highest Edge



Modulation: 64QAM (3 MHz)

Lowest Edge

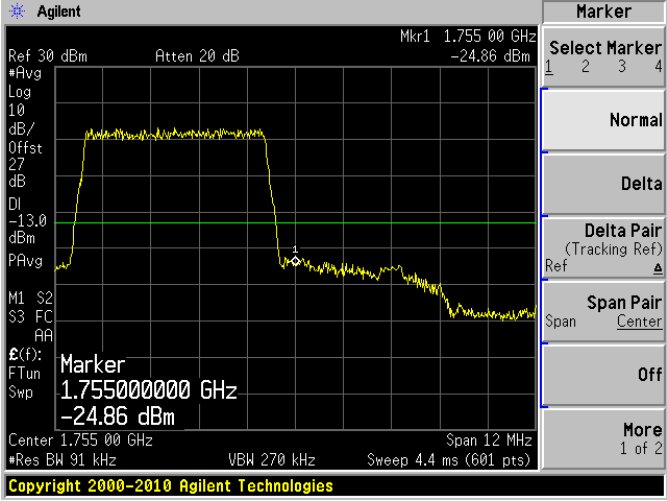
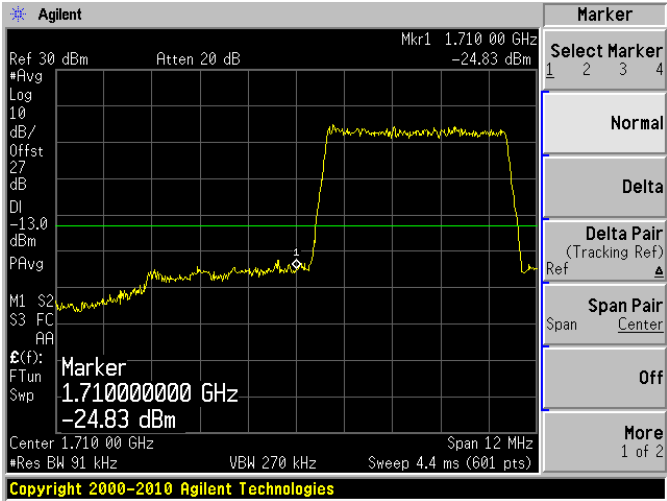
Highest Edge



Modulation: QPSK (5 MHz)

Lowest Edge

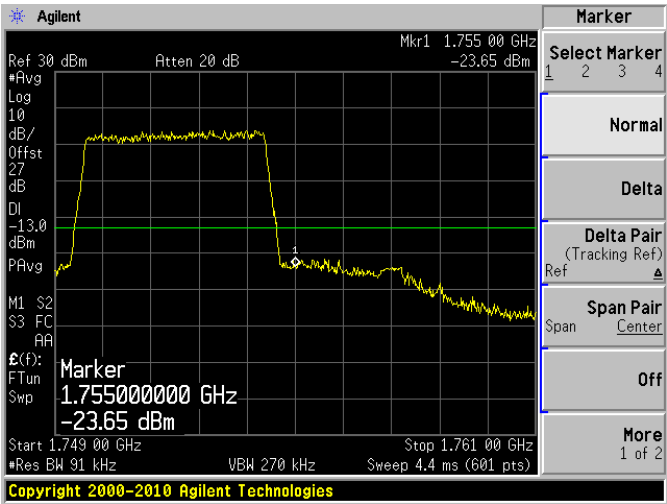
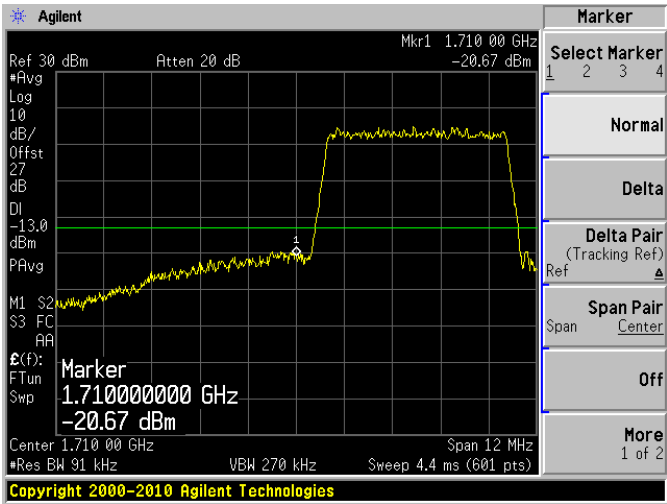
Highest Edge



Modulation: 16QAM (5 MHz)

Lowest Edge

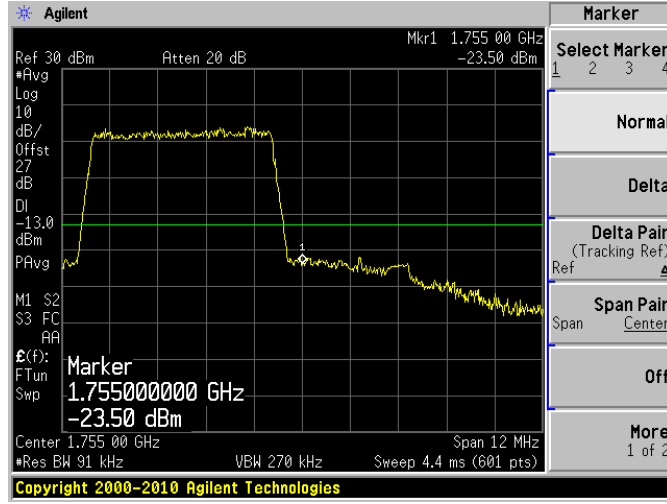
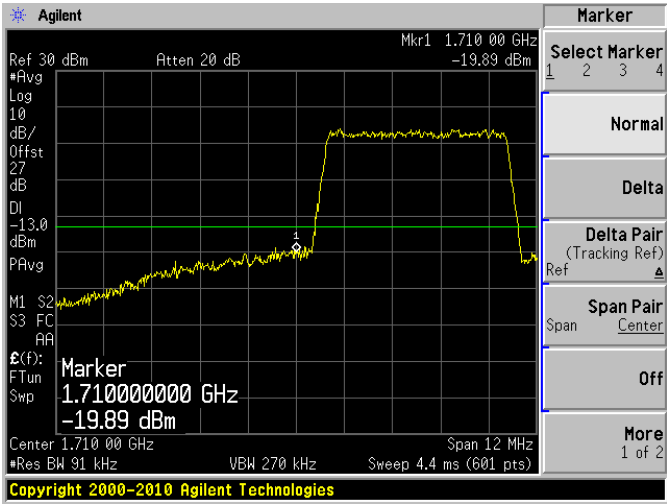
Highest Edge



Modulation: 64QAM (5 MHz)

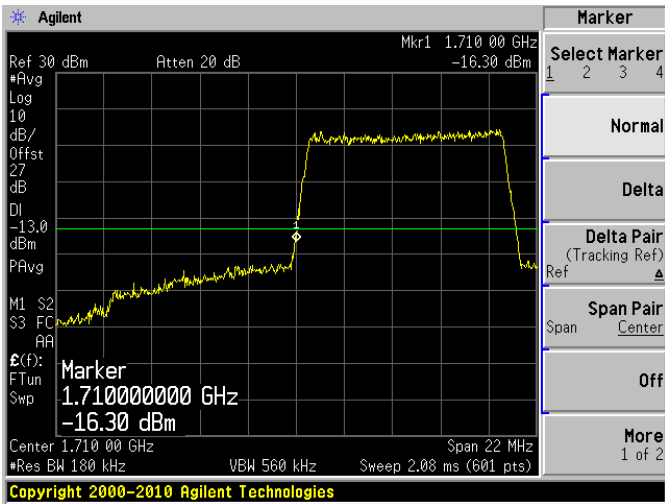
Lowest Edge

Highest Edge

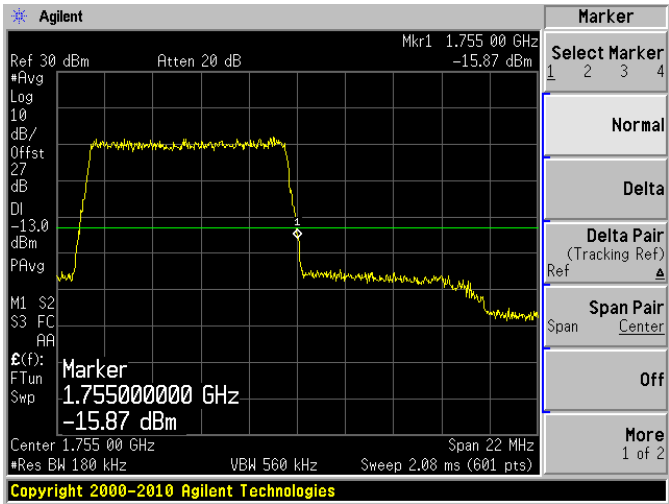


Modulation: QPSK (10 MHz)

Lowest Edge

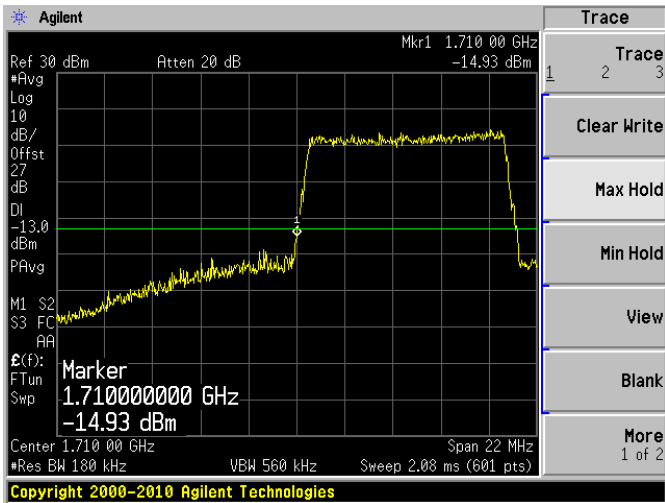


Highest Edge

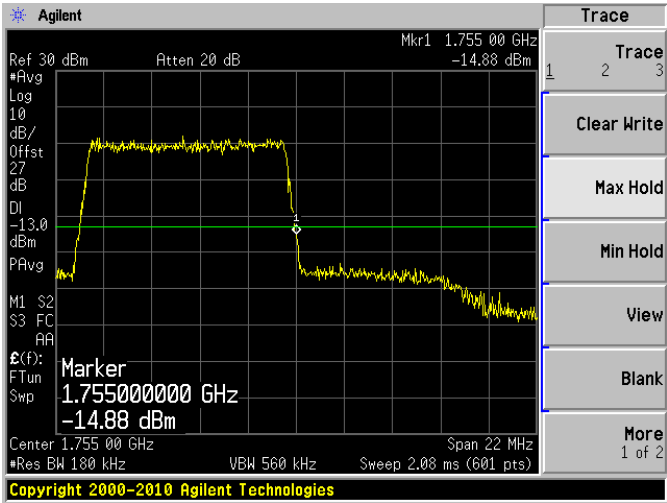


Modulation: 16QAM (10 MHz)

Lowest Edge



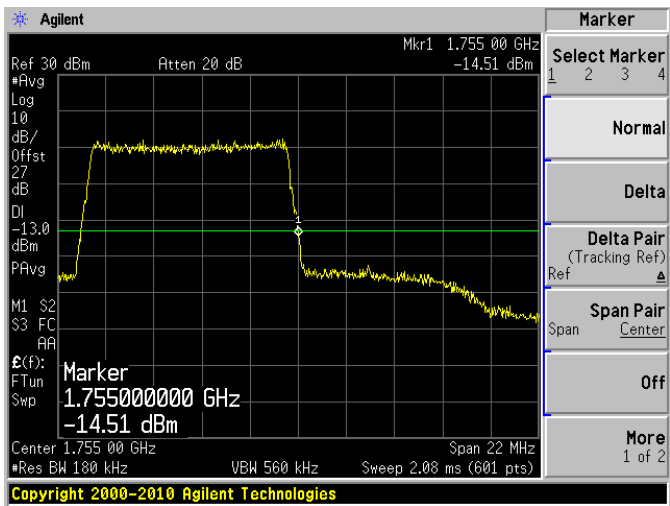
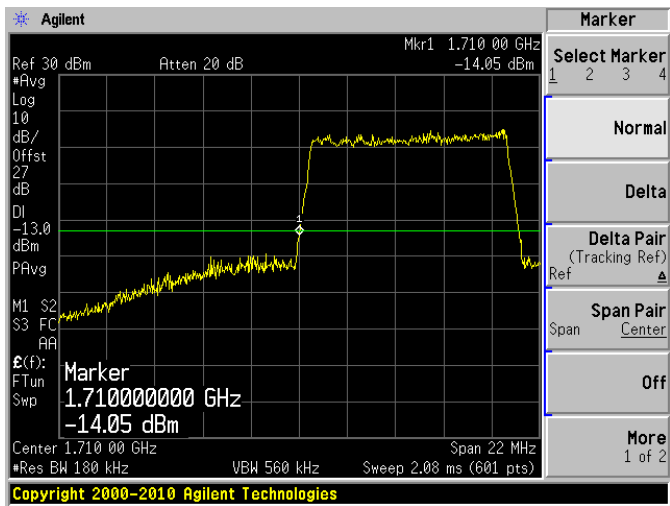
Highest Edge



Modulation: 16QAM (10 MHz)

Lowest Edge

Highest Edge

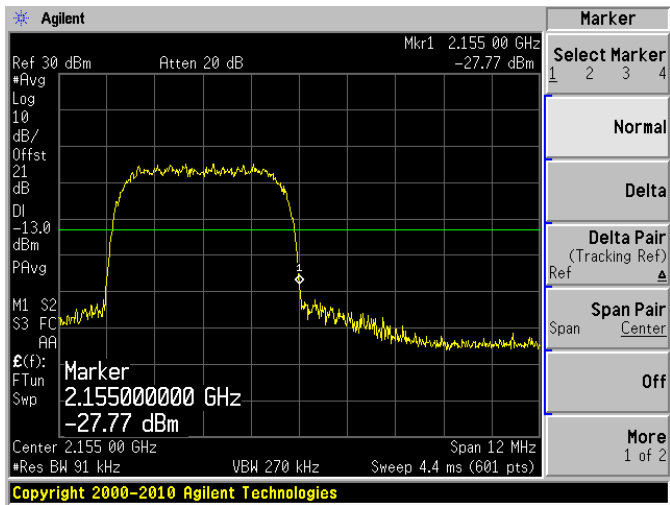
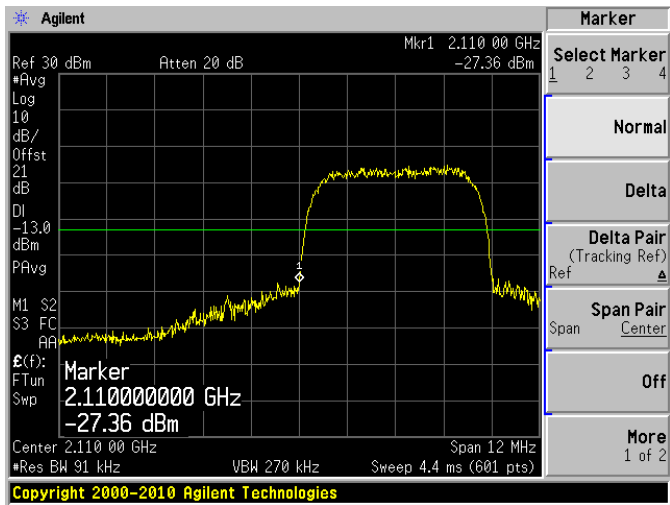


DL: 2110-2155 MHz

WCDMA/HSPA

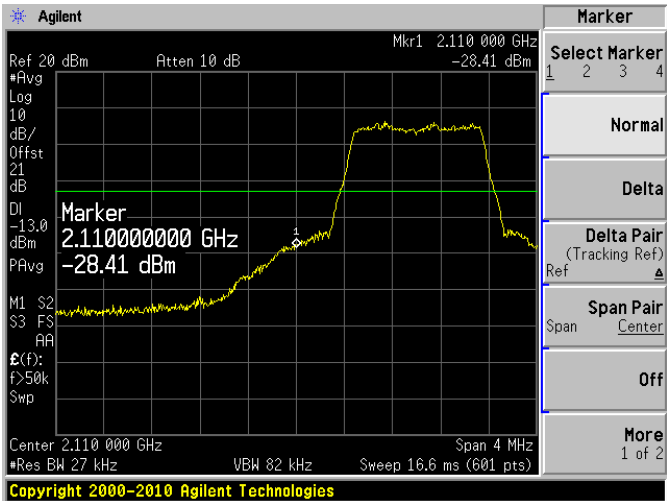
Lowest Edge

Highest Edge

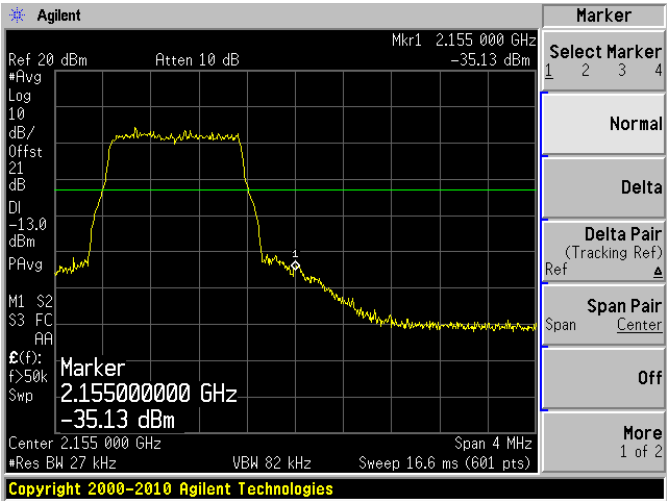


Modulation: QPSK (1.4 MHz)

Lowest Edge

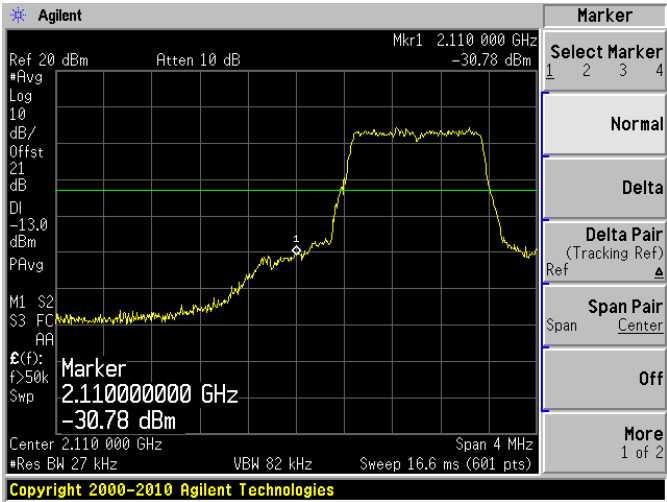


Highest Edge

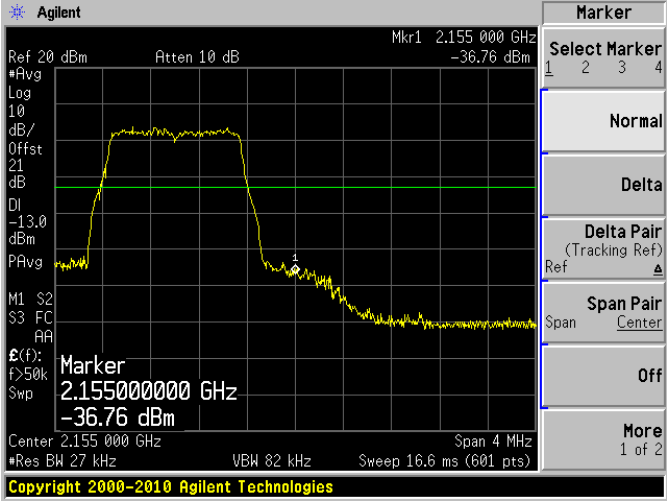


Modulation: 16QAM (1.4MHz)

Lowest Edge

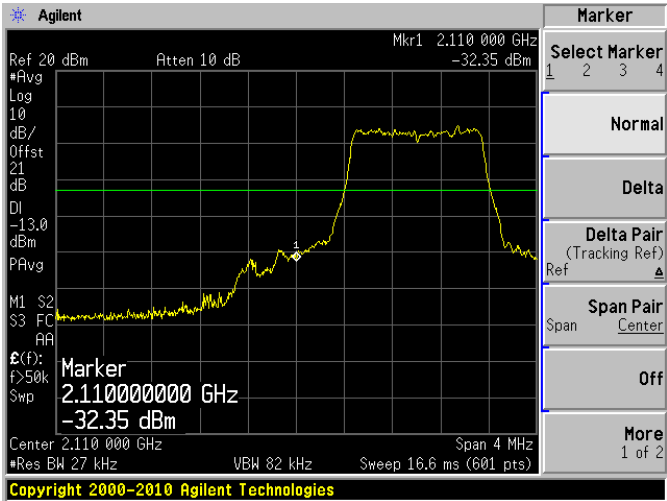


Highest Edge

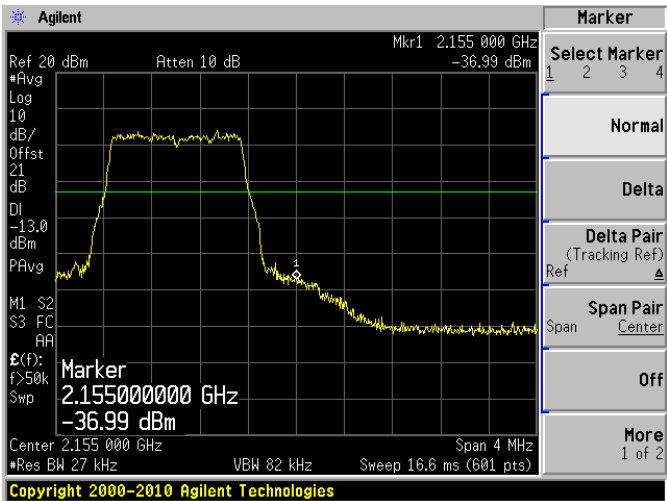


Modulation: 64QAM (1.4MHz)

Lowest Edge

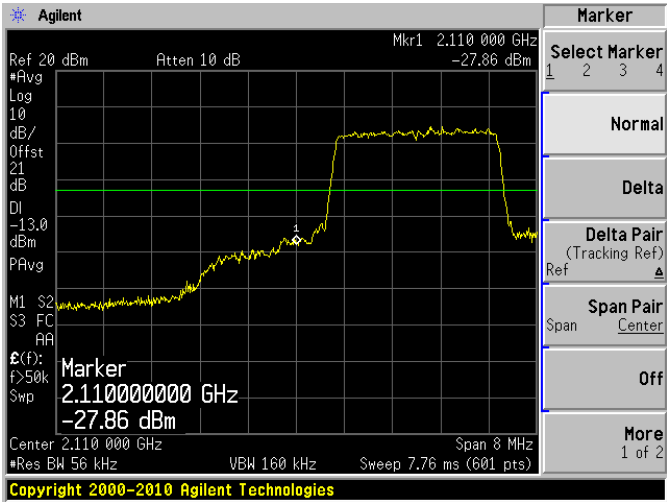


Highest Edge

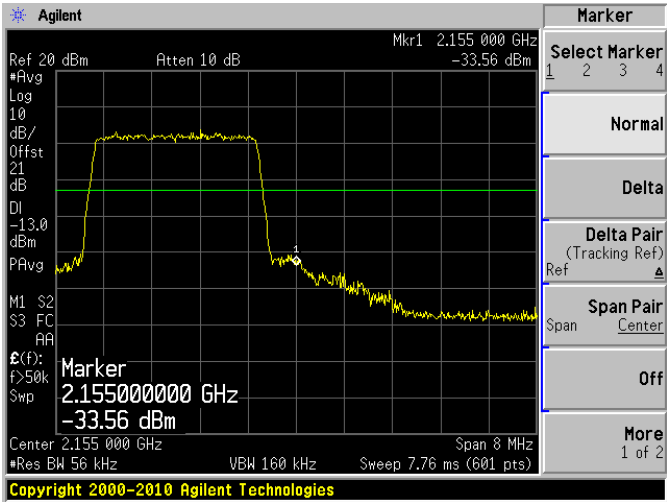


Modulation: QPSK (3 MHz)

Lowest Edge

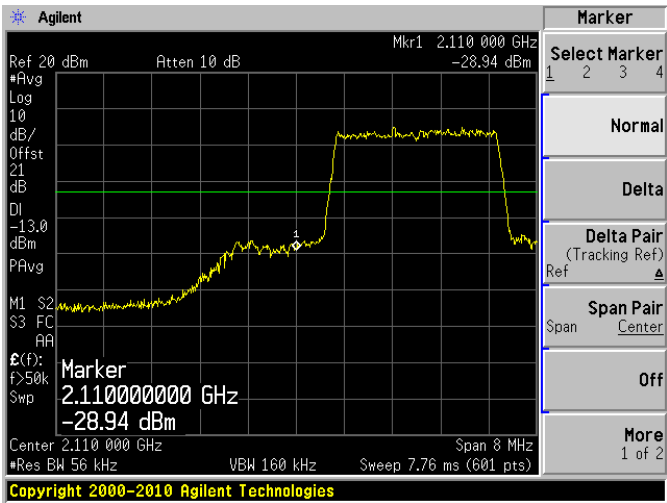


Highest Edge

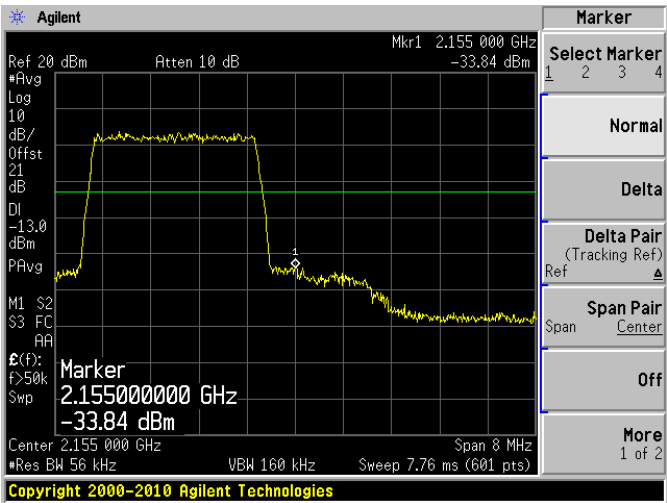


Modulation: 16QAM (3 MHz)

Lowest Edge

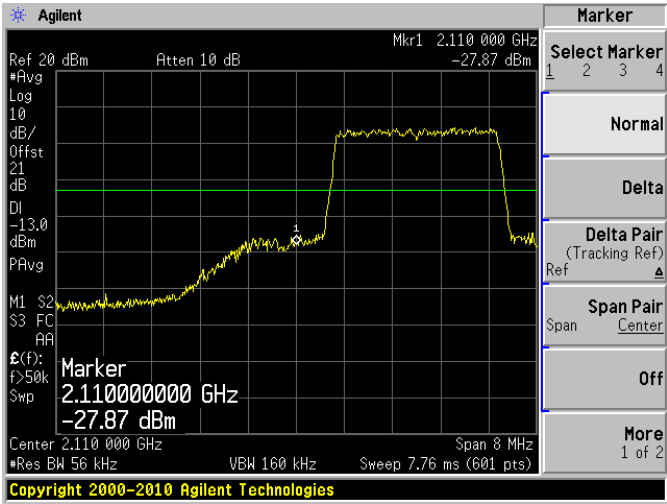


Highest Edge

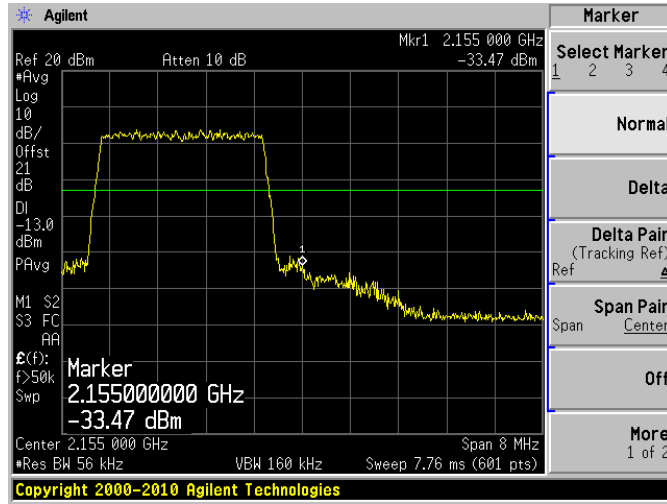


Modulation: 64QAM (3 MHz)

Lowest Edge

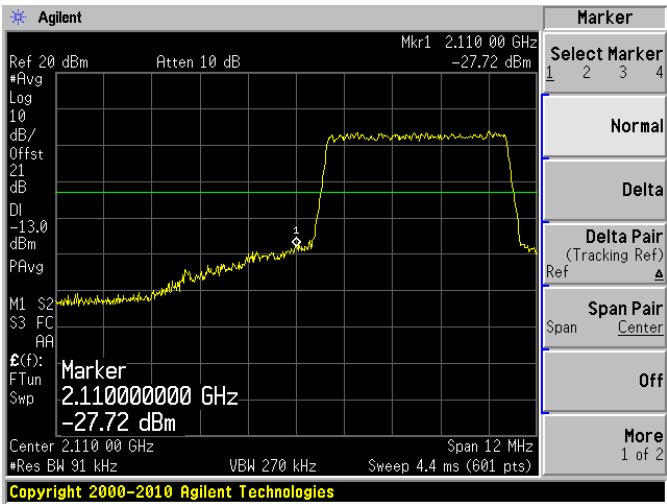


Highest Edge

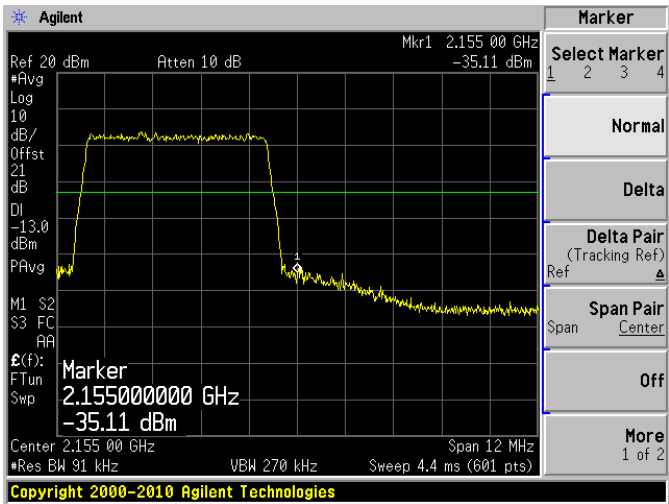


Modulation: QPSK (5 MHz)

Lowest Edge

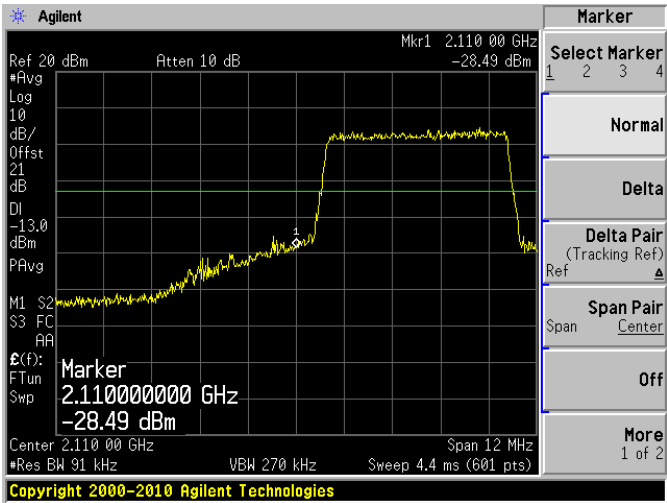


Highest Edge

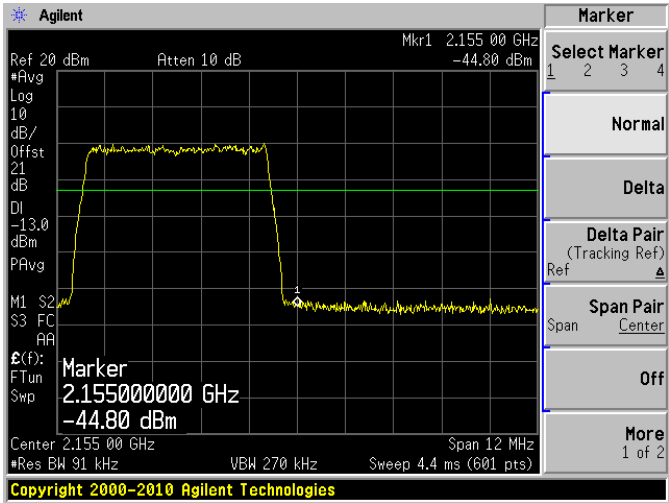


Modulation: 16QAM (5 MHz)

Lowest Edge

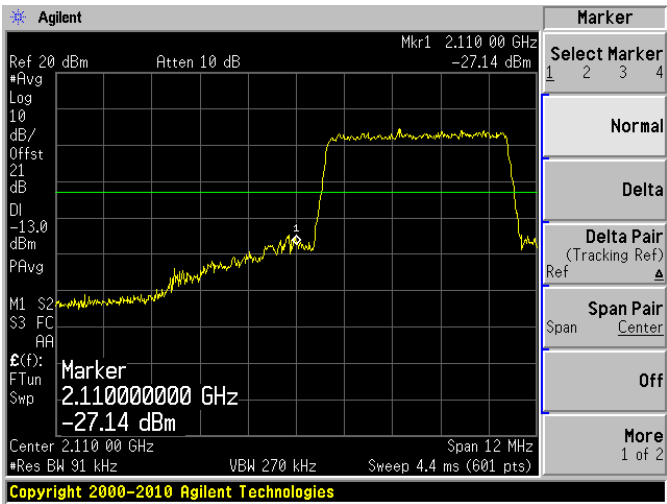


Highest Edge

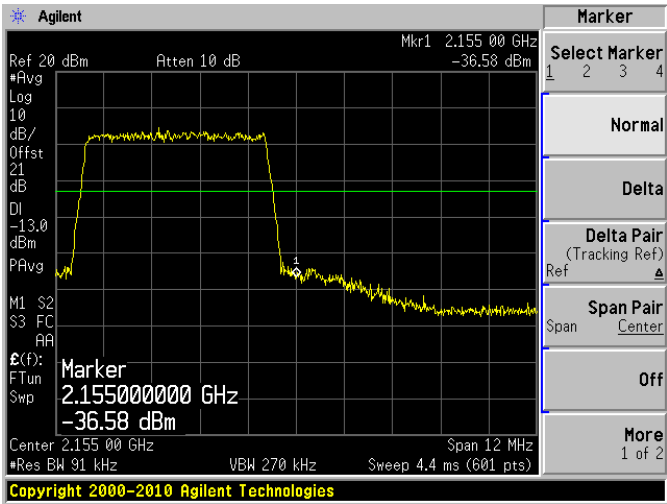


Modulation: 64QAM (5 MHz)

Lowest Edge

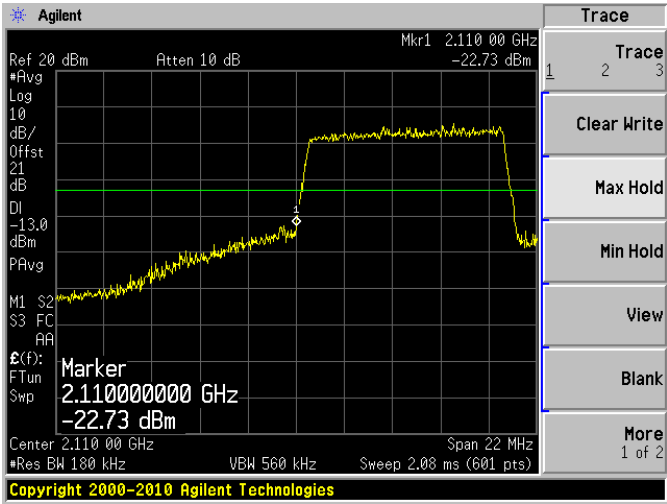


Highest Edge

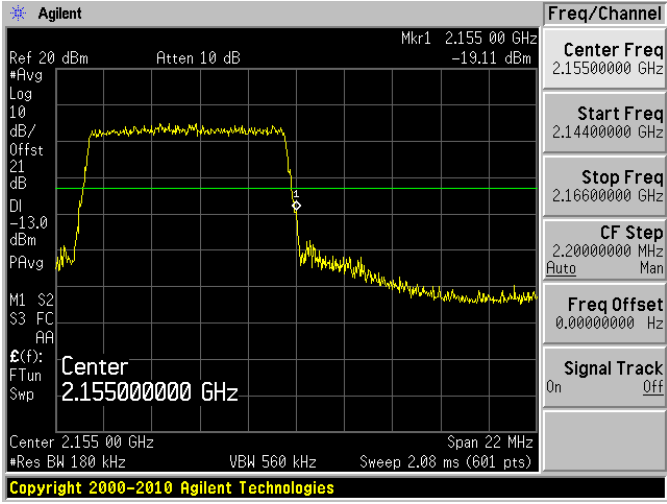


Modulation: QPSK (10 MHz)

Lowest Edge



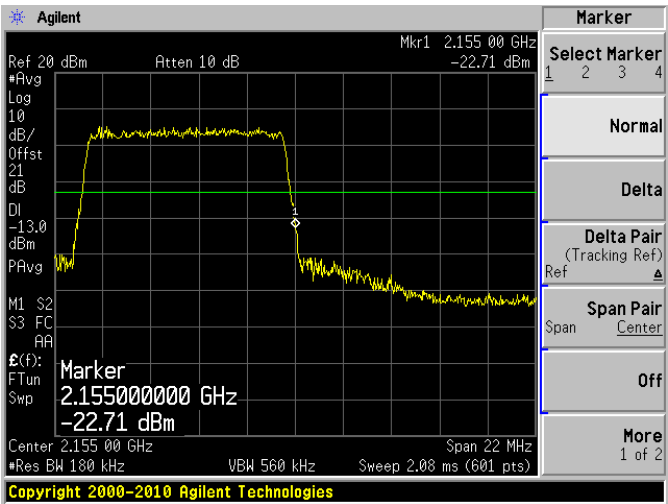
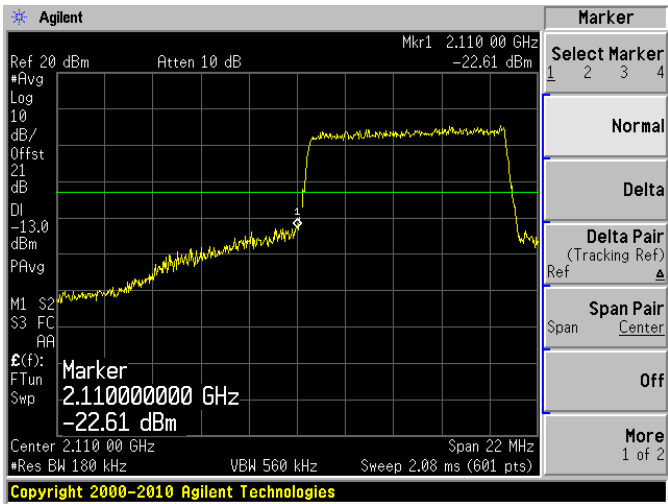
Highest Edge



Modulation: 16QAM (10 MHz)

Lowest Edge

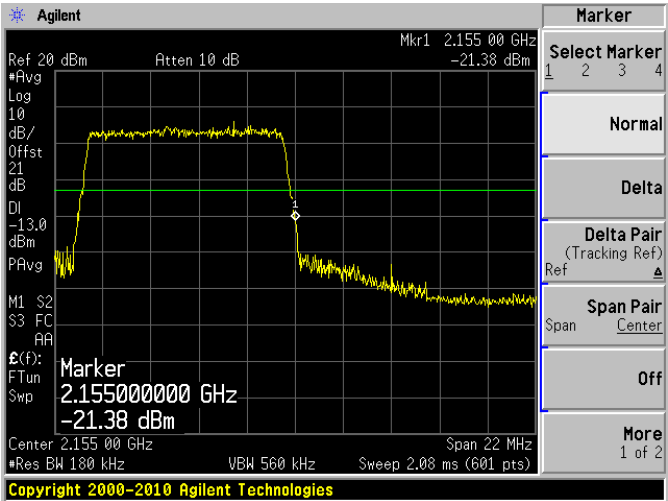
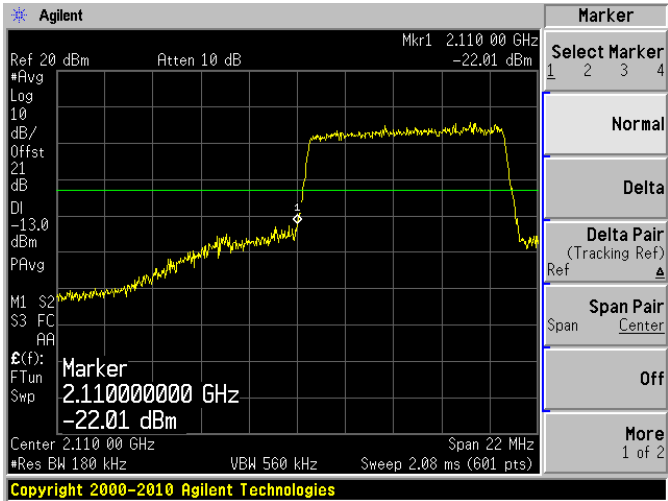
Highest Edge



Modulation: 64QAM (10 MHz)

Lowest Edge

Highest Edge



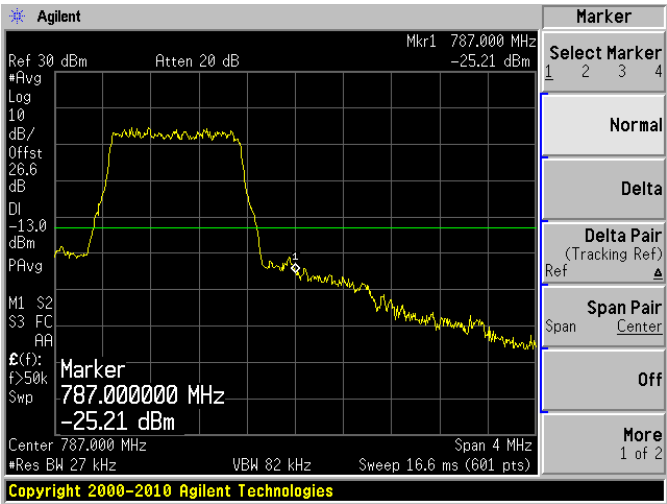
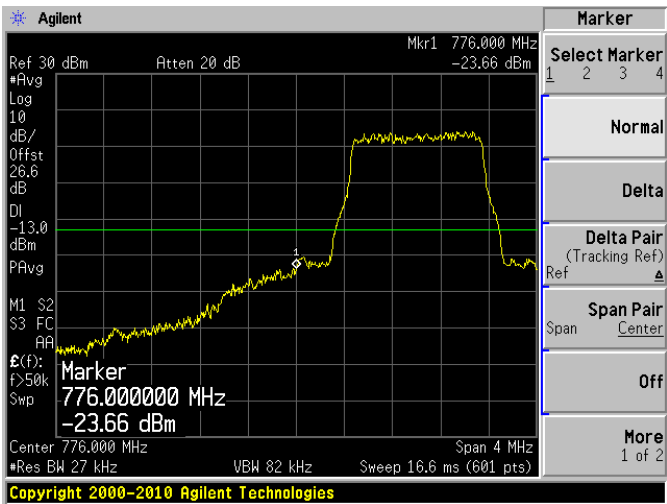
LTE Band (Band 13)

UL: 776-787 MHz

Modulation: QPSK (1.4 MHz)

Lowest Edge

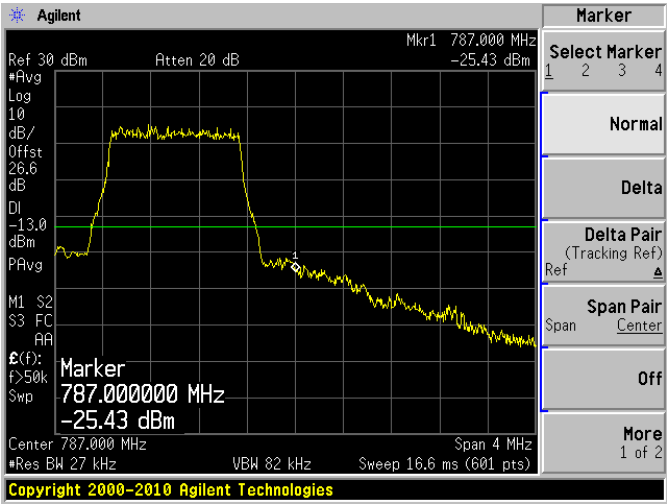
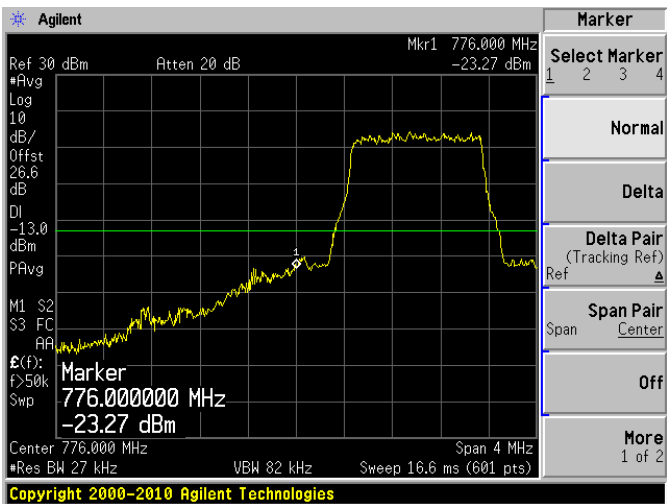
Highest Edge



Modulation: 16QAM (1.4 MHz)

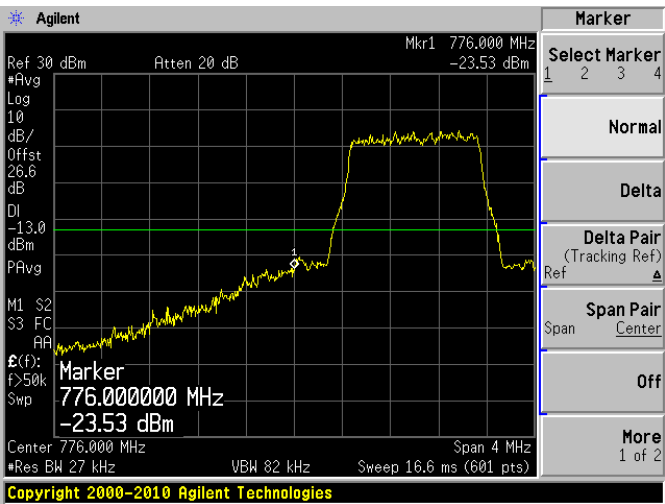
Lowest Edge

Highest Edge

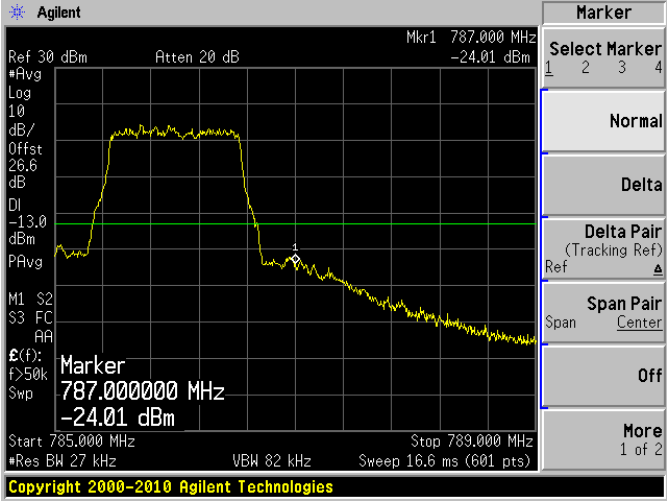


Modulation: 64QAM (1.4 MHz)

Lowest Edge

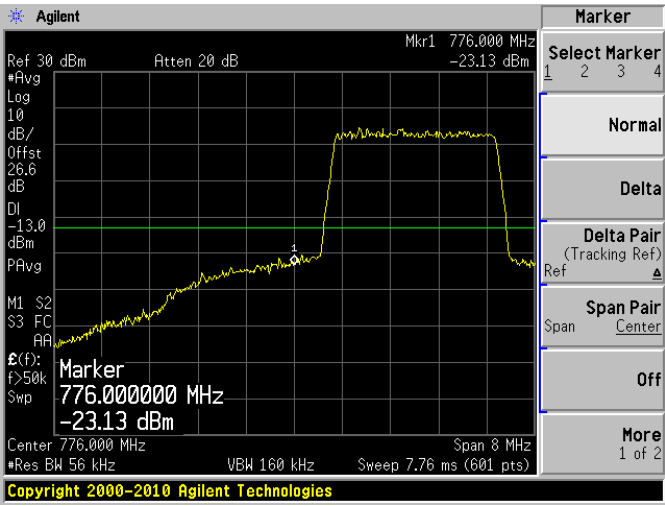


Highest Edge

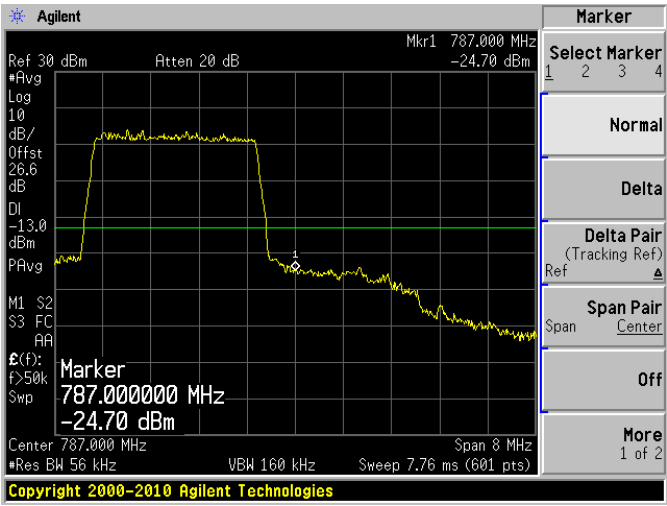


Modulation: QPSK (3 MHz)

Lowest Edge



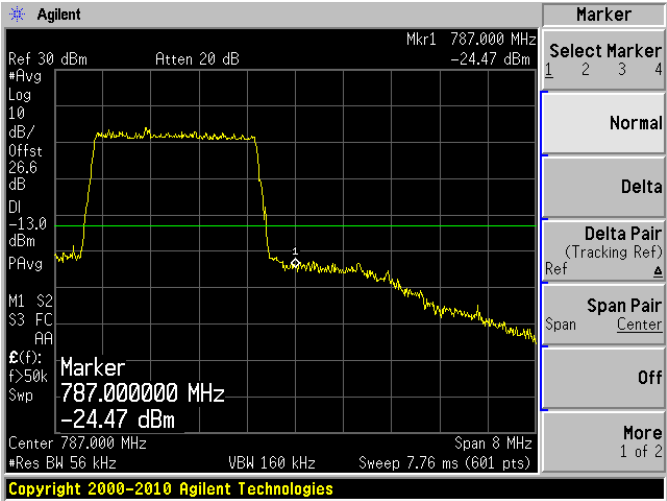
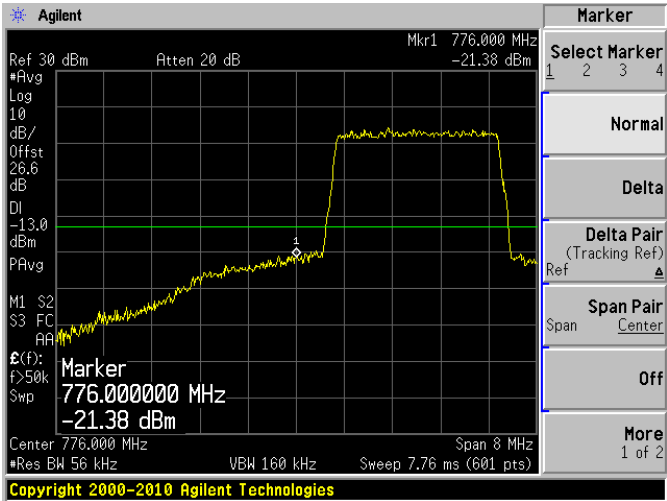
Highest Edge



Modulation: 16QAM (3 MHz)

Lowest Edge

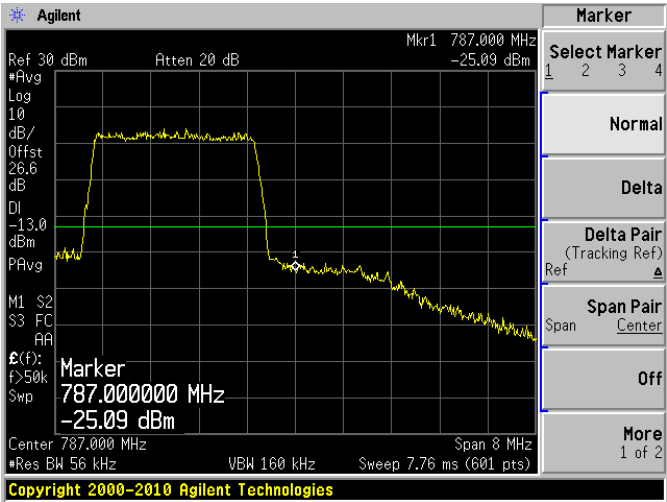
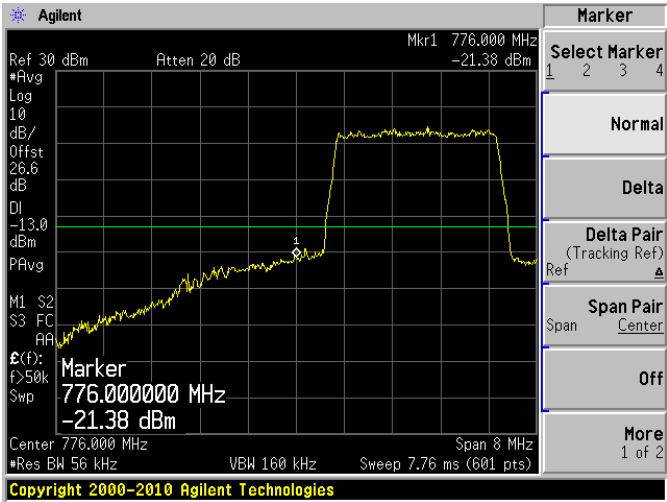
Highest Edge



Modulation: 64QAM (3 MHz)

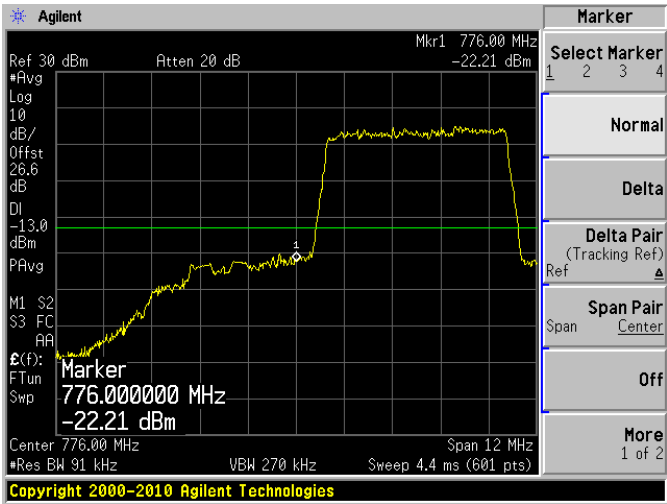
Lowest Edge

Highest Edge

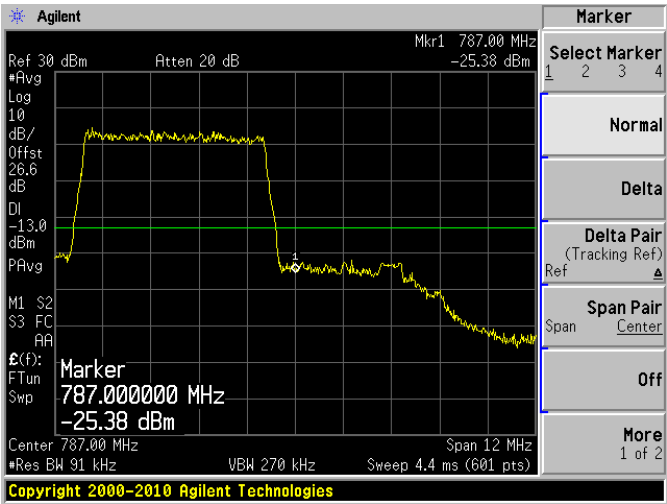


Modulation: QPSK (5 MHz)

Lowest Edge

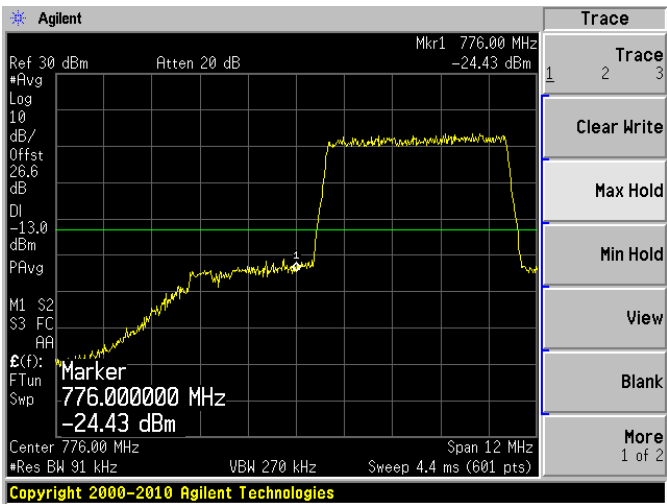


Highest Edge

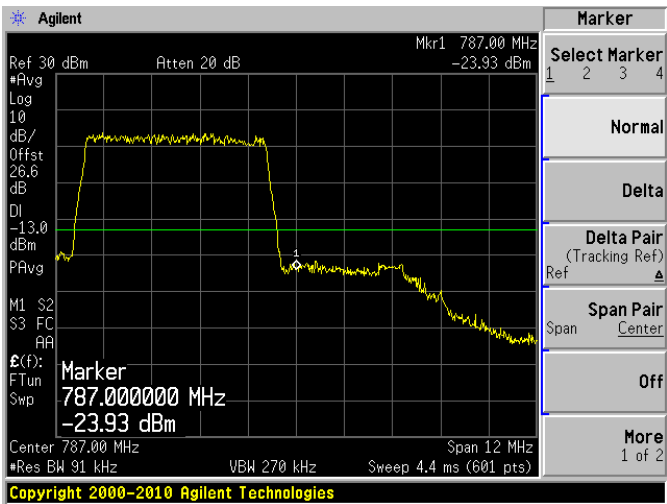


Modulation: 16QAM (5MHz)

Lowest Edge



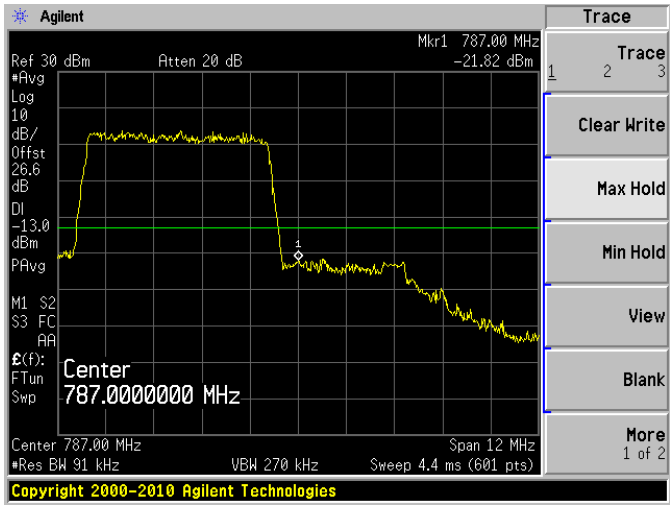
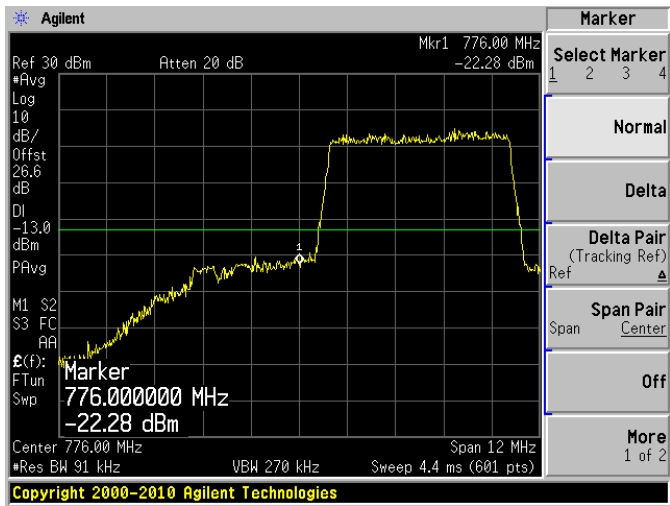
Highest Edge



Modulation: 64QAM (5 MHz)

Lowest Edge

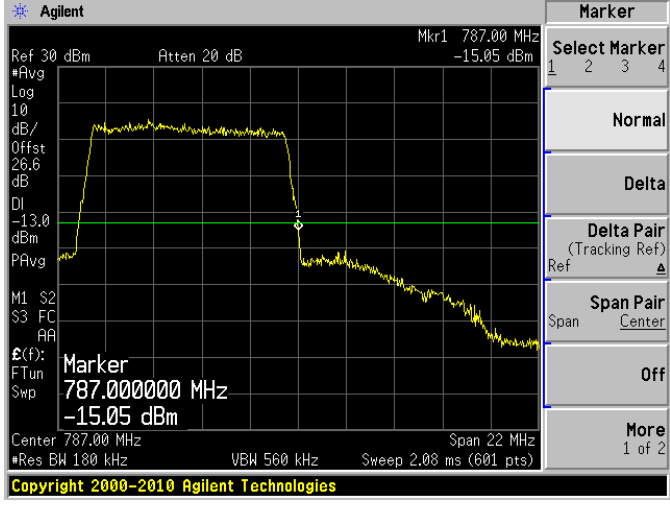
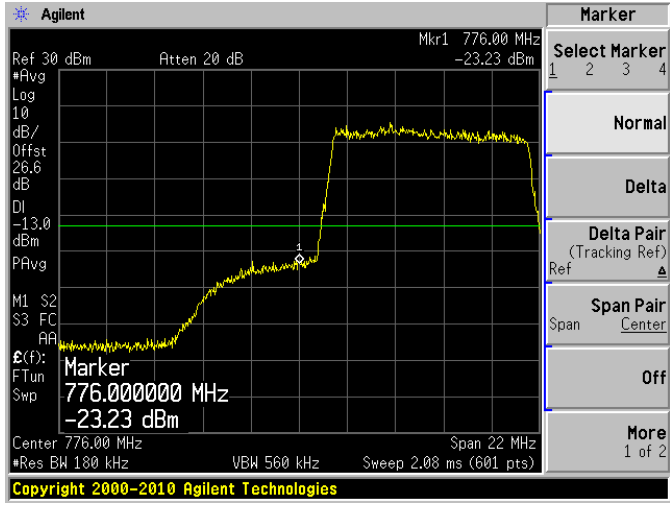
Highest Edge



Modulation: QPSK (10 MHz)

Lowest Edge

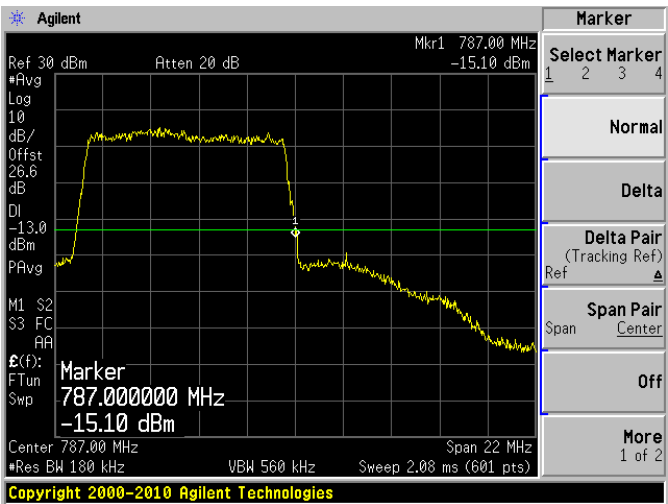
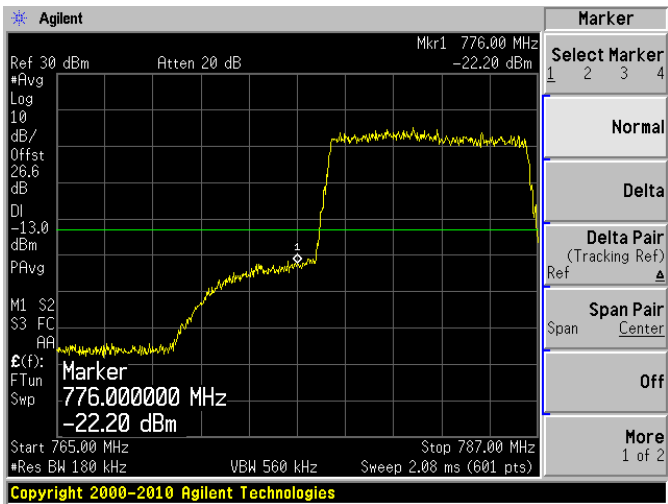
Highest Edge



Modulation: 16QAM (10 MHz)

Lowest Edge

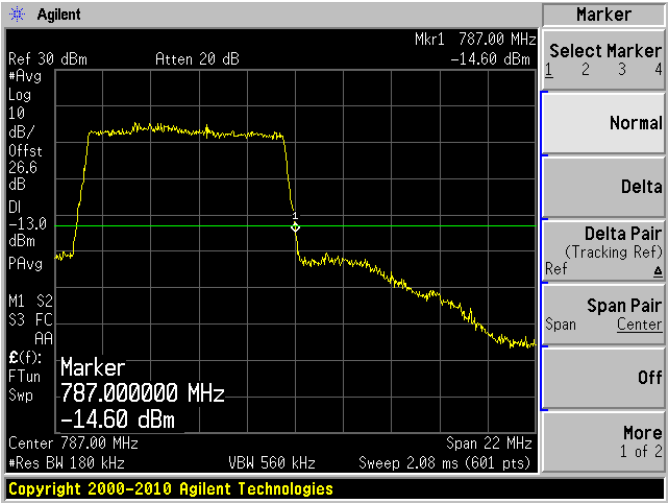
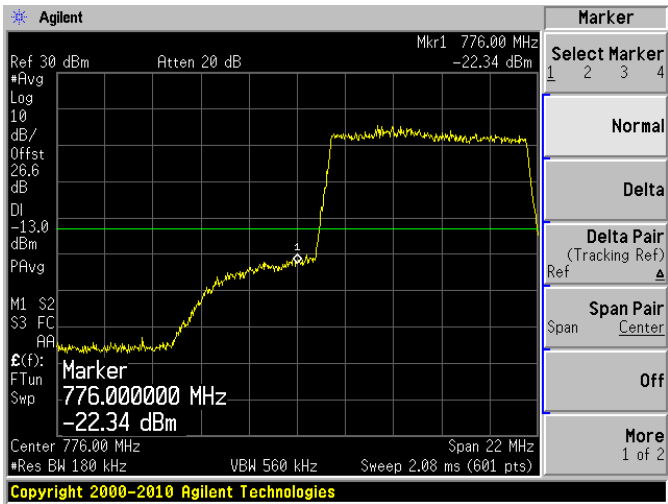
Highest Edge



Modulation: 64QAM (10 MHz)

Lowest Edge

Highest Edge

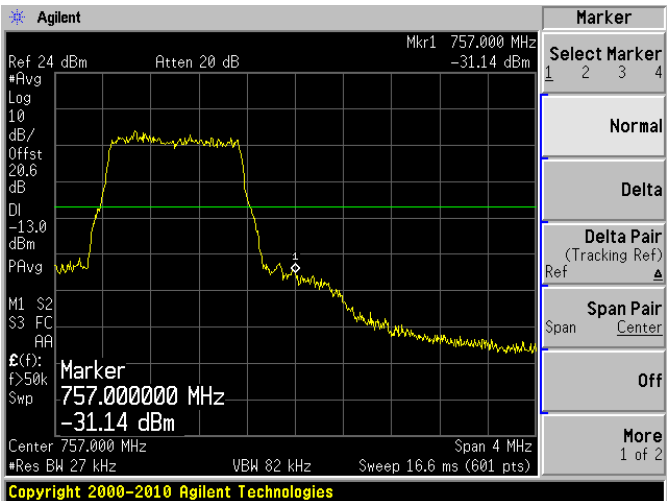
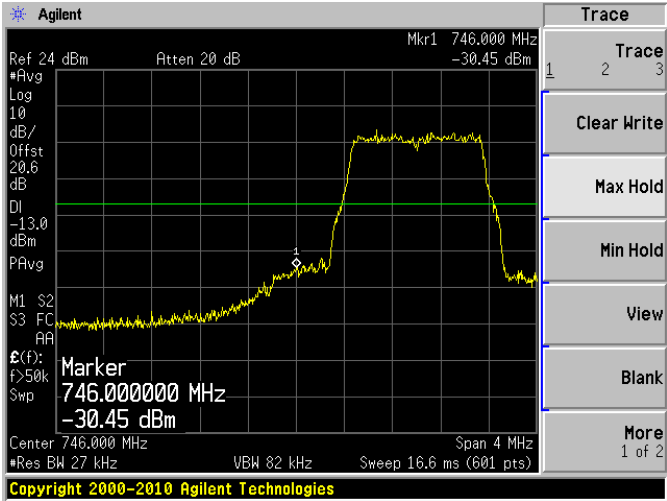


DL: 746-757 MHz

Modulation: QPSK (1.4 MHz)

Lowest Edge

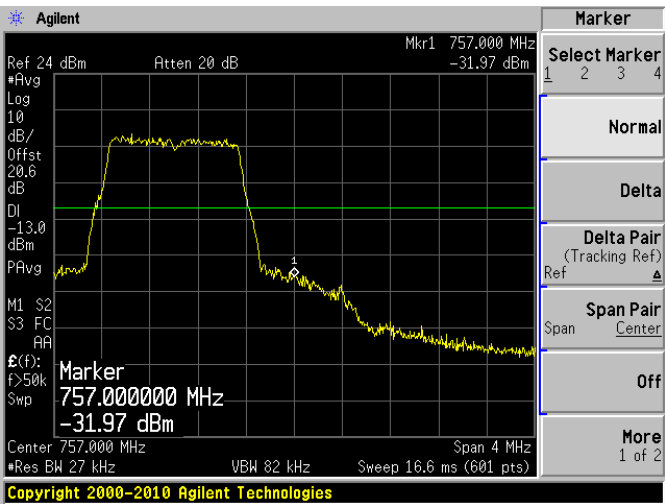
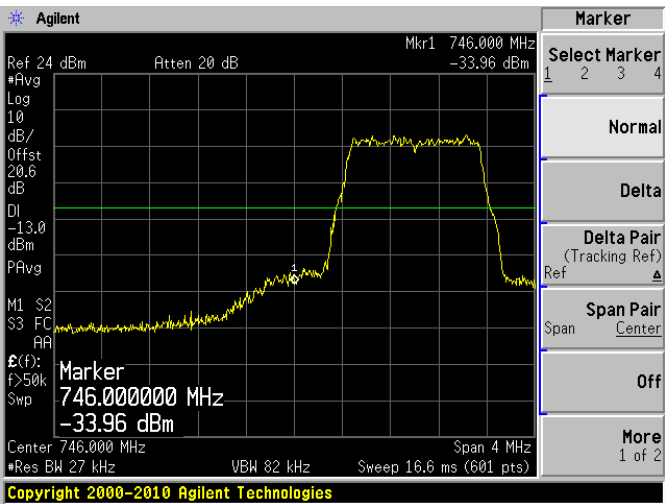
Highest Edge



Modulation: 16QAM (1.4 MHz)

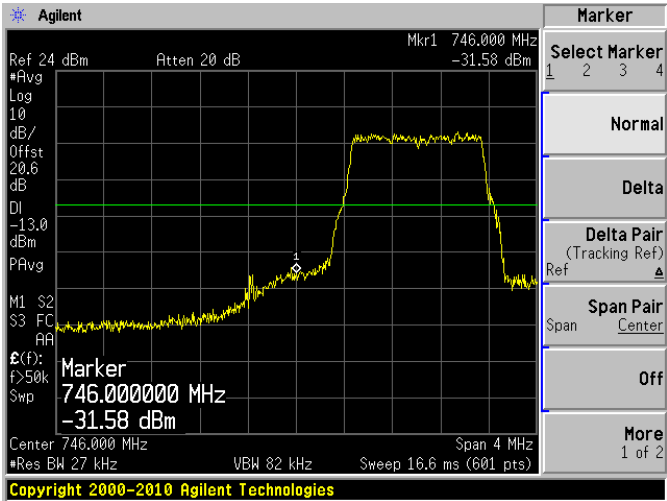
Lowest Edge

Highest Edge

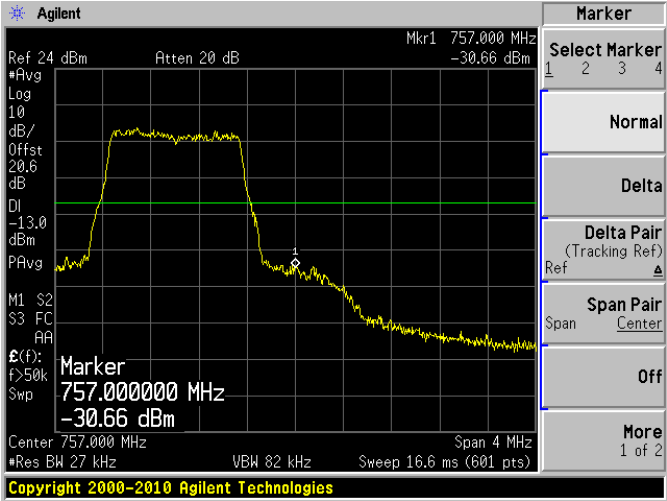


Modulation: 64QAM (1.4 MHz)

Lowest Edge

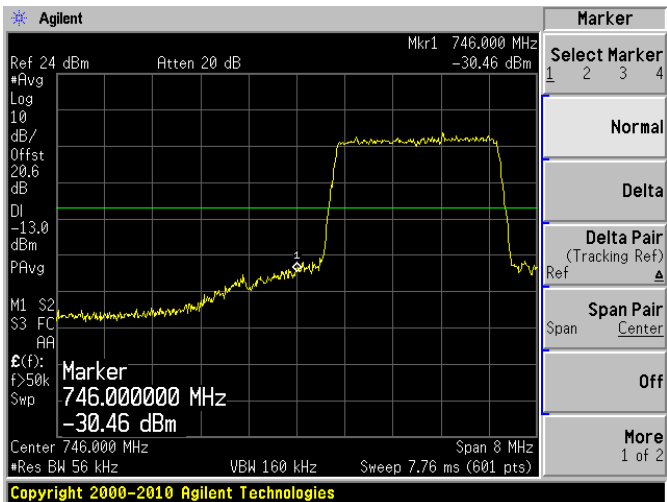


Highest Edge

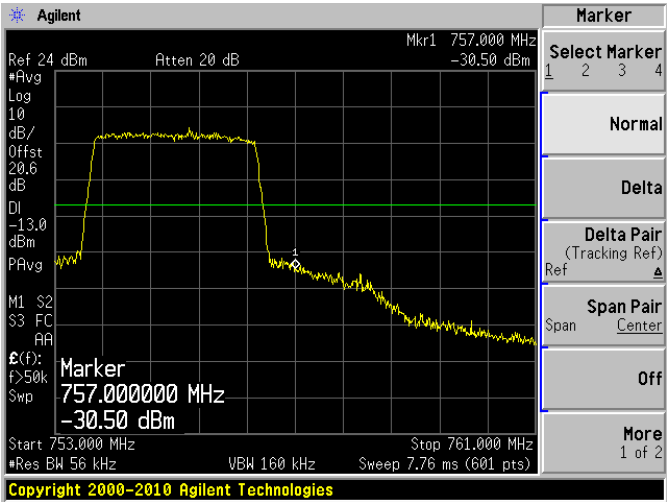


Modulation: QPSK (3 MHz)

Lowest Edge



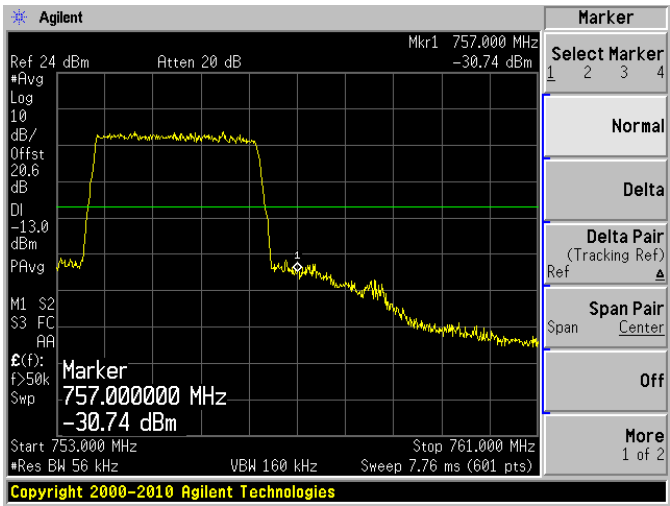
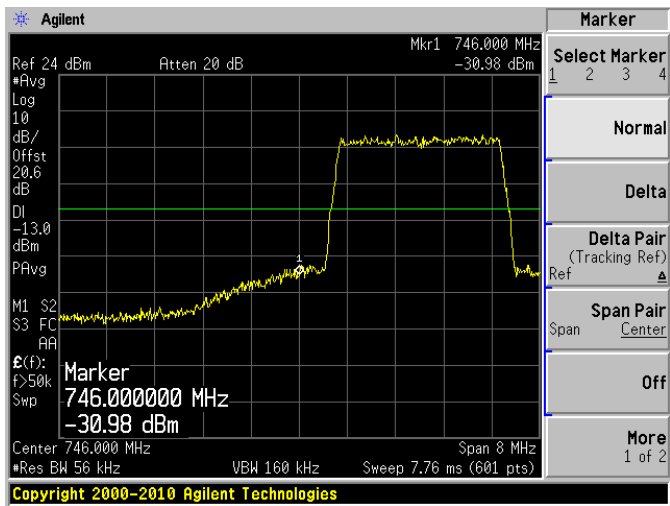
Highest Edge



Modulation: 16QAM (3 MHz)

Lowest Edge

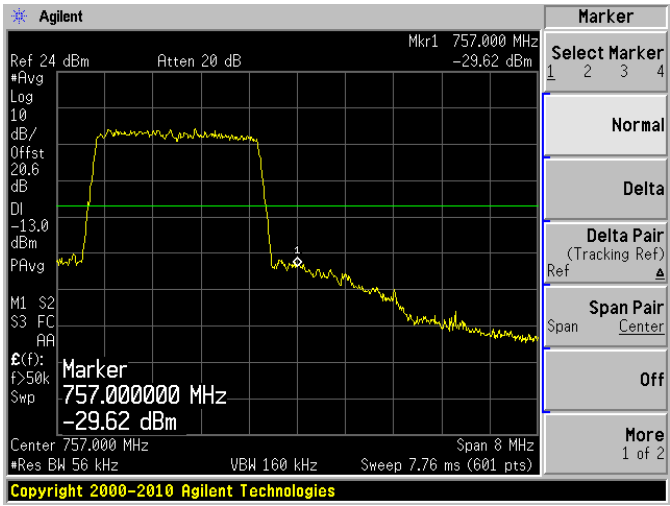
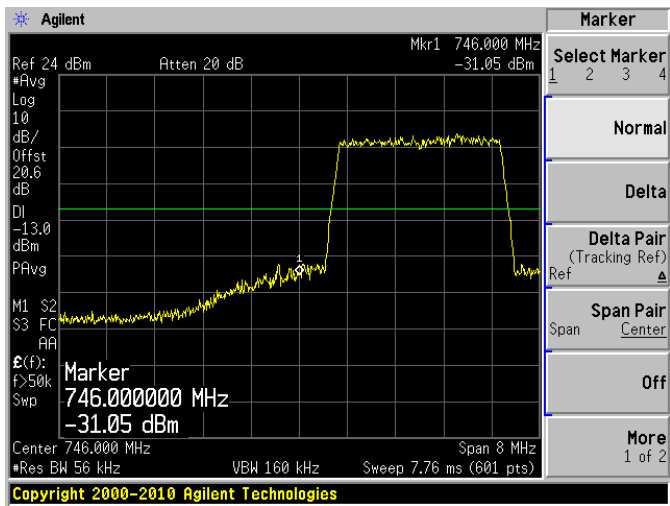
Highest Edge



Modulation: 64QAM (3 MHz)

Lowest Edge

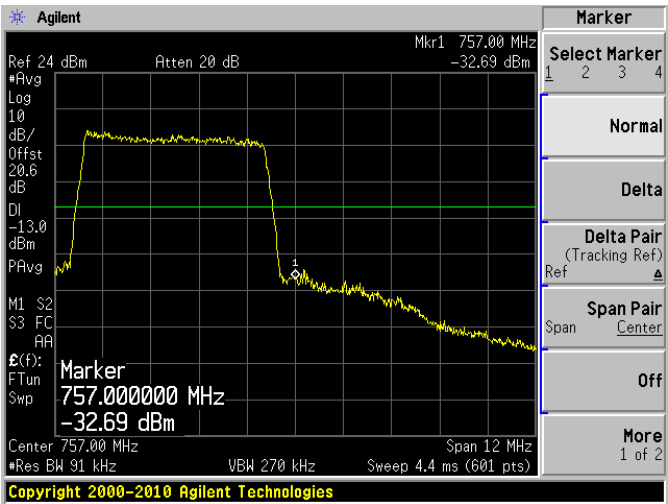
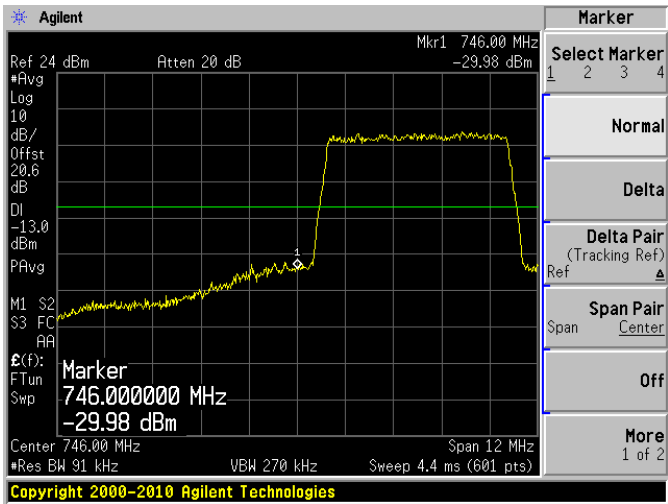
Highest Edge



Modulation: QPSK (5 MHz)

Lowest Edge

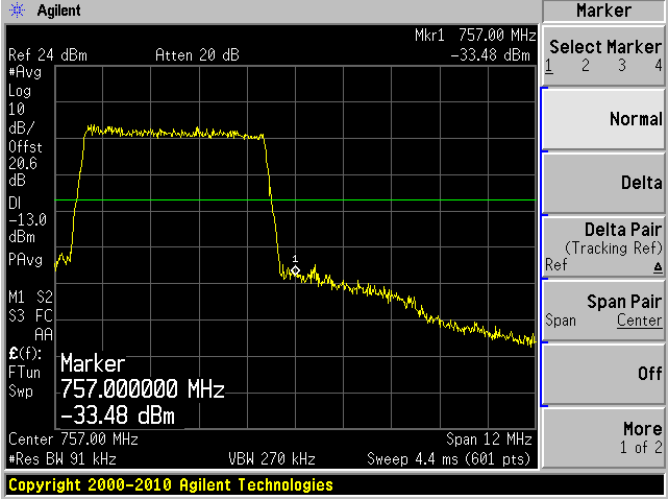
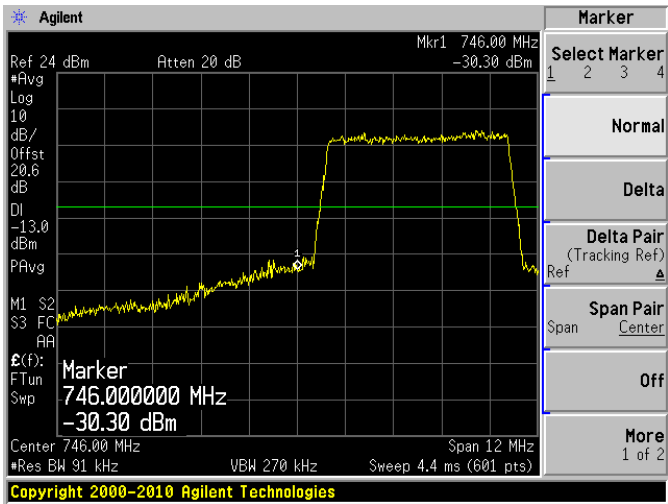
Highest Edge



Modulation: 16QAM (5MHz)

Lowest Edge

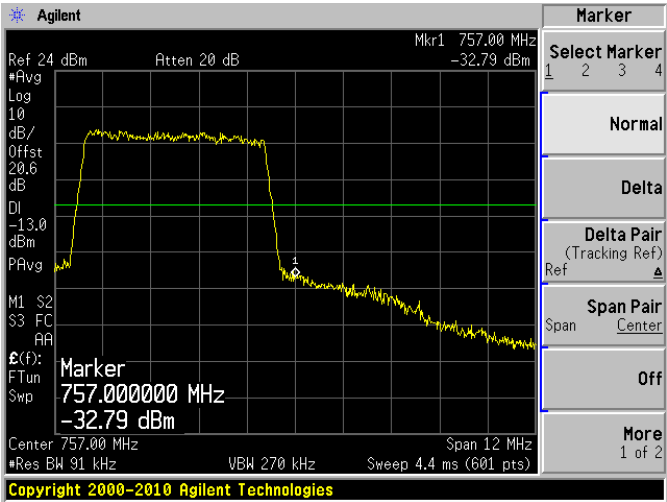
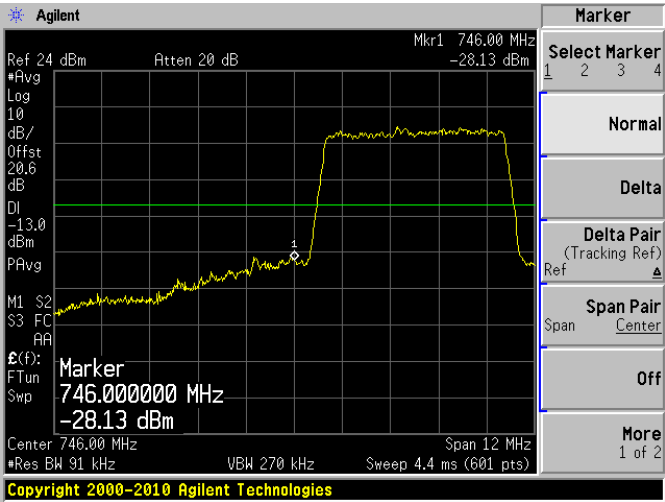
Highest Edge



Modulation: 64QAM (5 MHz)

Lowest Edge

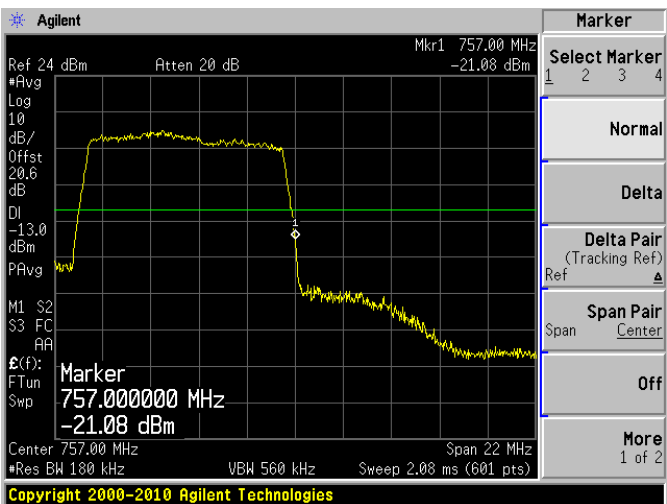
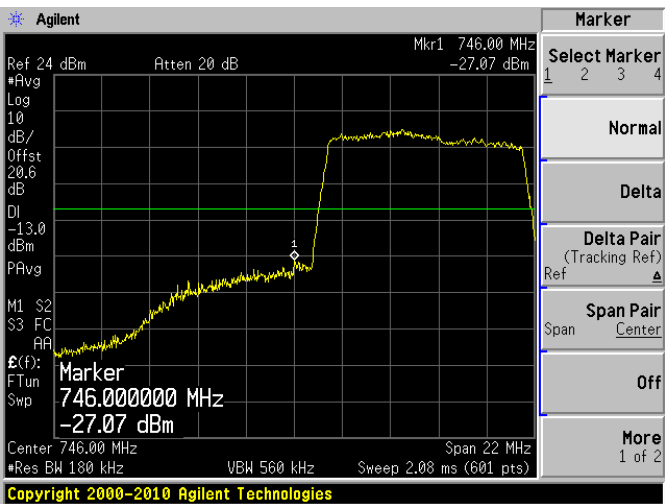
Highest Edge



Modulation: QPSK (10 MHz)

Lowest Edge

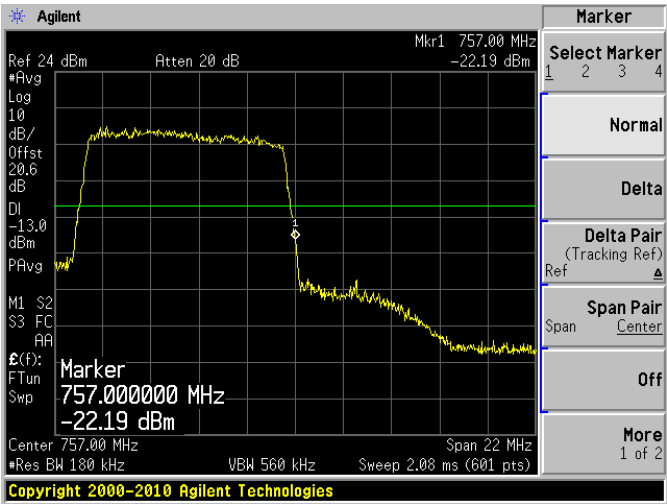
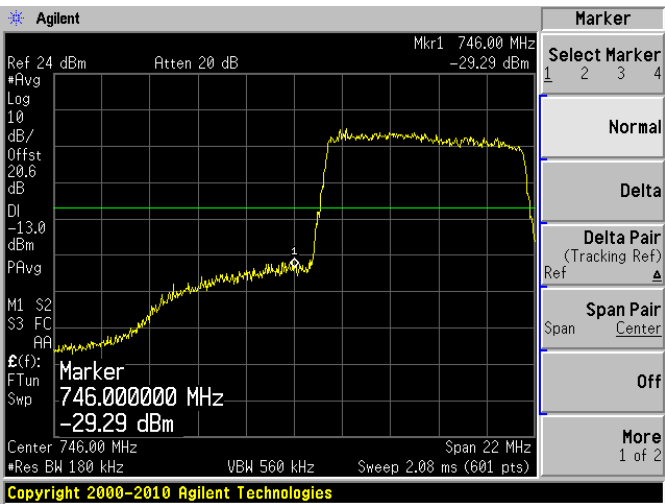
Highest Edge



Modulation: 16QAM (10 MHz)

Lowest Edge

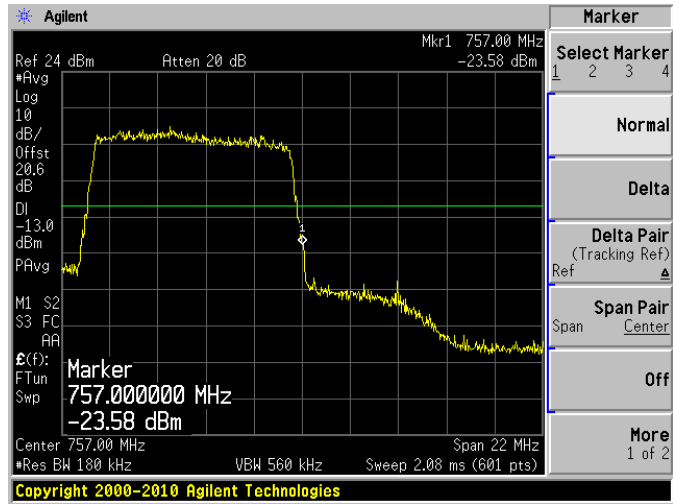
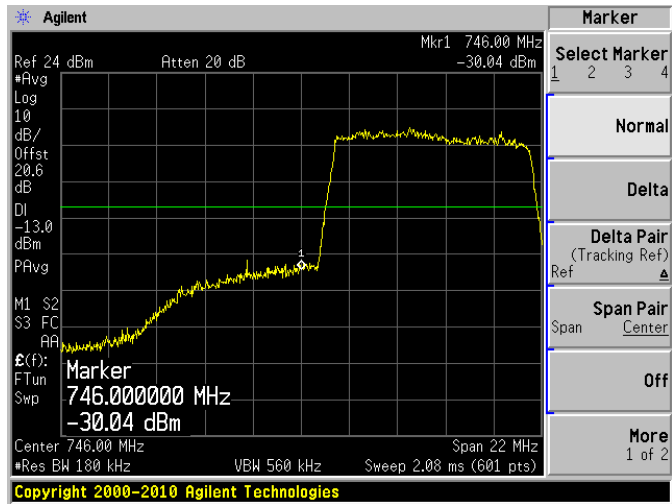
Highest Edge



Modulation: 64QAM (10 MHz)

Lowest Edge

Highest Edge



9 FCC §2.1055 & §27.54 – FREQUENCY STABILITY

9.1 Applicable Standard

According to FCC §27.54, the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

9.2 Test Procedure

The frequency stability of the transmitter is measured by:

- a.) Temperature: The temperature is varied from - 30 °C to + 50 °C using an environmental chamber.
- b.) Primary Supply Voltage: The primary supply voltage is varied from battery end point to 115 % of the voltage normally at the input to the device or at the power supply terminals if cables are not normally supplied.

Specification — the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within $\pm 0.000\ 25\ %$ ($\pm 2.5\text{ppm}$) of the center frequency.

9.3 Test Results

Not applicable, EUT is a signal booster; the signal source is from the signal generator, no frequency stability applied.

10 FCC §1.1307(b), §27.52 & §2.1091 - RF EXPOSURE INFORMATION

10.1 Applicable Standard

According to FCC §1.1310 and §2.1091 (Mobile Devices) RF exposure is calculated.

Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	¹ (100)	30
1.34-30	824/f	2.19/f	¹ (180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

f = frequency in MHz

¹ = Plane-wave equivalent power density

10.2 MPE Prediction

Predication of MPE limit at a given distance, Equation from OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2$$

Where: S = power density

P = power input to antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna

Test Results:

WCDMA/HSPA Band (Band 4) Uplink

Maximum peak output power at antenna input terminal (dBm): 20.02

Maximum peak output power at antenna input terminal (mW): 100.46

Prediction distance (cm): 20.00

Prediction frequency (MHz): 1732.4

Antenna Gain, typical (dBi): 5.0

Antenna Gain, typical (numeric): 3.16

Power density at predication frequency and distance (mW/cm²): 0.063

MPE limit for uncontrolled exposure at predication frequency (mW/cm²): 1.0

WCDMA/HSPA Band (Band 4) Downlink

<u>Maximum peak output power at antenna input terminal (dBm):</u>	<u>10.09</u>
<u>Maximum peak output power at antenna input terminal (mW):</u>	<u>10.21</u>
<u>Prediction distance (cm):</u>	<u>20</u>
<u>Prediction frequency (MHz):</u>	<u>2132.4</u>
<u>Antenna Gain, typical (dBi):</u>	<u>3.00</u>
<u>Antenna Gain, typical (numeric):</u>	<u>2.00</u>
<u>Power density at predication frequency and distance (mW/cm²):</u>	<u>0.004</u>
<u>MPE limit for uncontrolled exposure at predication frequency (mW/cm²):</u>	<u>1.0</u>

LTE Band (Band 13) Uplink

<u>Maximum peak output power at antenna input terminal (dBm):</u>	<u>20.59</u>
<u>Maximum peak output power at antenna input terminal (mW):</u>	<u>114.55</u>
<u>Prediction distance (cm):</u>	<u>20</u>
<u>Prediction frequency (MHz):</u>	<u>782</u>
<u>Antenna Gain, typical (dBi):</u>	<u>3.0</u>
<u>Antenna Gain, typical (numeric):</u>	<u>2.0</u>
<u>Power density at predication frequency and distance (mW/cm²):</u>	<u>0.0455</u>
<u>MPE limit for uncontrolled exposure at predication frequency (mW/cm²):</u>	<u>0.5213</u>

LTE Band (Band 13) Downlink

<u>Maximum peak output power at antenna input terminal (dBm):</u>	<u>13.56</u>
<u>Maximum peak output power at antenna input terminal (mW):</u>	<u>22.70</u>
<u>Prediction distance (cm):</u>	<u>20</u>
<u>Prediction frequency (MHz):</u>	<u>755</u>
<u>Antenna Gain, typical (dBi):</u>	<u>3.0</u>
<u>Antenna Gain, typical (numeric):</u>	<u>2.0</u>
<u>Power density at predication frequency and distance (mW/cm²):</u>	<u>0.0090</u>
<u>MPE limit for uncontrolled exposure at predication frequency (mW/cm²):</u>	<u>0.5033</u>

Results

For uplink and downlink, the highest power density levels at 20 cm are below the MPE uncontrolled exposure limit.